

Recent Transformation of Residential Quarters in Japanese Metropolitan City

Itsuki NAKABAYASHI

INTRODUCTION

A distinct post-war trend of urbanization in Japanese society has brought about not only the striking spatial expansion of urban built-up areas, but the heavy transformation of the ready established built-up areas toward the more densely inhabited nature than those in original forms. Although geographers have studied elaborately the various aspects in the areal expansion of urban areas since the earlier days of urbanization trend, the aspects in the latter face of urbanization are rather recently concerned by them in accordance with their growing appreciation on men's living conditions in urban areas.

To our knowledge, it is the increase of the dwelling houses density that acts an essential role to connect the urbanization with the deterioration of living conditions in urban residential areas. Both the population movement into urban areas and the increase of employment rate in total urban areas of the nation have recently produced the growing demands for new construction of urban dwelling houses. 3.9 million of specialized houses for dwellings have been lately constructed on the urban areas in the period of 1963-1968 (14.9 million in total in 1968), and the dwelling houses combined with other uses, to the number of 0.1 million in the same period (only 0.2 million in total in 1968), were increased. It can be assumed from the regional pattern of population increase that the most part of those newly built houses are allotted to metropolitan areas in the period.

These extraordinarily speedy increases of new dwelling houses have undoubtedly effects on the structures of residential districts from the viewpoint of architecture in and outside of the established built-up areas in Japanese metropolises. This paper intends to research, taking the wards area of Tokyo metropolis (-ku area, within about 20km of CBD) by way of example, these effects especially on the ready built-up areas of Japanese metropolises, not on the suburban expansion of built-up areas on which geographers have for a long term attended to their deep concerns. For the purpose, in this study the writer partially referred to the viewpoint and the procedure of analysis in urban planning section of technological science, which began to study on this theme earlier than in geography.

The work will approach the problem of living or environmental conditions in Japanese urban residential areas, through the following procedures; (1) to trace the general feature of established residential districts and the various types of them at present, (2) to refer to the process of the recent transformation of these residential districts, (3) to discuss the constitution of spatial component from a viewpoint of dweller's behaviors in these districts, and finally, (4) to elucidate a face of environmental conditions in present metropolitan residential areas on a clarified basis of those formations in the metropolitan residential area as a whole.

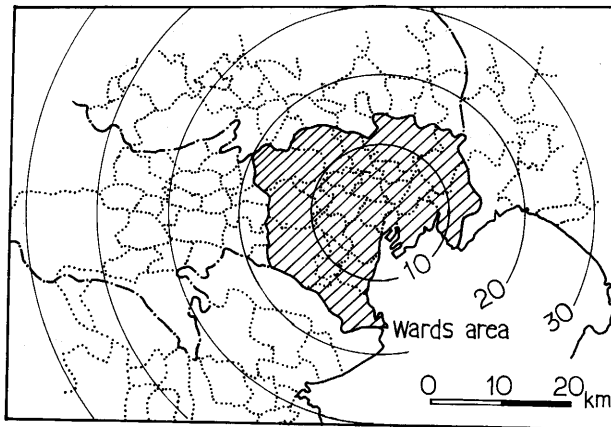


Fig. 1 Location map

Table 1 Population increase rate and new building rate of dwelling houses among the areas

distance from CBD (km.)	population increase rate (%)		newly built dwelling houses rate (%)		
	1955-1960	1960-1965	1960-1962	1965-1967	increase rate
50km. total	18.6	19.8	100.0	100.0	137.9
0-10km	13.4	-1.4	19.8	16.8	116.7
10-20km	29.8	25.3	43.4	36.8	116.7
20-30km	22.7	40.4	20.9	23.5	115.7
30-40km	15.4	36.9	8.7	13.7	216.8
40-50km	3.3	15.4	7.2	9.2	176.0

population; census of the population
new building; statistical yearbook of the building

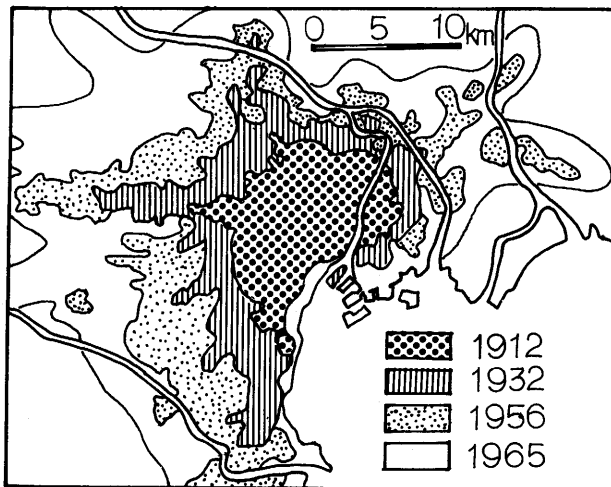


Fig. 2 Areal expansions of the built-up area in Tokyo metropolitan (by Yamaga. S. 1967)

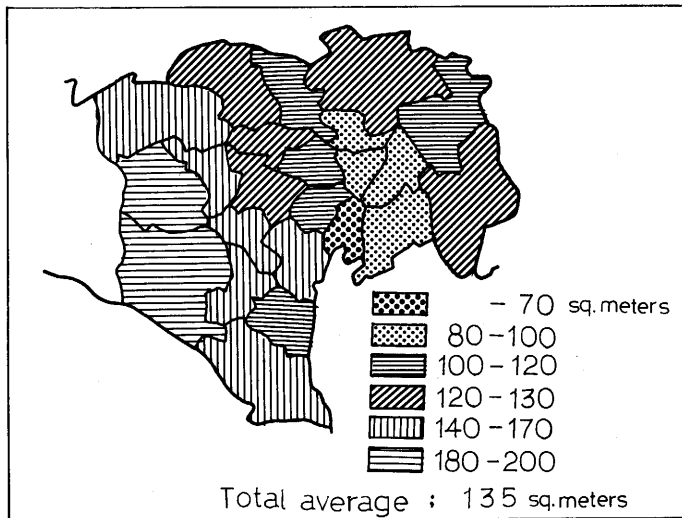


Fig. 3 Average space of housing lot for dwelling (1968, wards area in Tokyo)

GENERAL TENDENCIES IN RECENT TRANSFORMATION OF RESIDENTIAL DISTRICTS

The heavy areal expansions of the built-up area in Tokyo Metropolis, being caused by its population increase as shown in Table 1, appear to have almost filled up its wards area till 1965, as demonstrated in Fig. 2. But, before it was filled up, the population in wards area had began to stagnate after 1958, and turned to decrease in 1962. While the population of wards area is recently decreasing as a whole, the average size of a dwelling house or its housing lot, too, has decreased in wards area in the same period, as proved in Table 2 and Fig. 3. This somewhat queer appearance results from the two facts that the decrease of the total space for dwelling, accompanied with the change of dwelling use into the others, is surpassing the decrease of population or dwellers in the inner circle of the wards area, and that population is still on a course of increase locally in the outer peripheries of it (Fig. 4).

This change of the size of a dwelling toward the smaller has, accompanied with apparent contraction of space for a dwelling or per head, produced the several types of over-crowded residential district in built-up area of Tokyo as the result of it. If the familiarized senses are introduced into the typification, the most prevailed styles of high density dwellings appear to be divided into the following three types of housing manners at present.

Table 2 Average space of dwelling houses (Tokyo pref.)

housing type	average space (square meters)	
	1963	1968
self-owned houses	83.1	82.5
issued houses	53.6	47.6
public housing	39.7	37.6
renting apartment	38.0	32.9
renting rooms	15.5	13.6

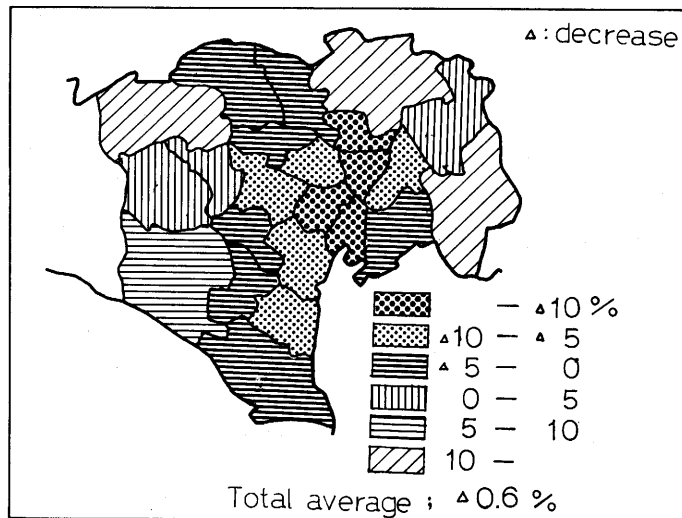


Fig. 4 Increase rate of population in wards area (1965-70)

(1) The commixture of new and old separated houses: But these houses are homogeneously unified in such style inherent to Japan as individually independent and wooden-made houses with one or two stories. Self-owned houses are dominant but not a few rented houses are also contained.

(2) The aggregation of so-called "mokuchin" type multiple dwellings: The post-war elevation of land price, of housing cost, and consequently increase of dwelling density in urban areas produced a specific type of renting apartments in a style of wooden-made houses of usually two stories. This style of apartment, constructed at an extremely cheap cost, is capable of the higher density of population than above (1) type because of the very poor size of every divided unit for family dwelling.

(3) Scattering and intermingling of so-called "mansion" type multiple dwellings: The multiple dwellings of this type, rather lately developed than above (2) type, are usually built as the larger architectures with steel frames and concrete walls. This type furnishes the relatively fine space for every dwelling unit, but is also capable of high density of population

Table 3 Environmental problems peculiar to each type of housing manners

Housing manner	Environmental problem	
	Structure of individual dwelling itself	Mutual affection by neighboring houses
Commixture of small separated houses	increase of rear houses in a poor alley, shortage of open space	
Aggregation of "mokuchin" type apartments	risk of a fire, scantiness of living space, infringement of respective privacies	shading of sun shine mutually
Scattering intermingling of "mansion" type apartments		shading of sun shine of north neighboring houses, wind circulation

as same as above (2) type, because of its eminent vertical extension with usually four to ten stories.

On these conditions, the environmental problems in recent Japanese urban residential districts will be classified for the dwellers into the two types, the land (physical) conditions in circumference of dwellers and the conditions derived from the architectural structure of their own dwelling houses. The latter is further divided into the two, that is, what is caused by the structure of individual dwelling itself, such as the scantiness of living space, and what results from the mutual affection of neighboring dwelling houses, such as the shading of sun shine or obstructing of wind circulations. From this point of view, all of the three types of over-crowded residential areas mentioned above cannot escape the problems of the latter two categories. These problems peculiar to each type of residential mode are manifested in Table 3.

THE DETERMINATION OF THE SPATIAL UNITS FOR STUDY

Yet the territorial differentiation of these types of dwellings in small areas represents another characteristic face of urban residential districts in recent Japanese metropolises. Besides the complicated intermingling of commercial blocks, all these styles of over-crowded residential areas are segregated each other in small patches and intermingled in a residential district in mozaic pattern. Therefore, it becomes requisite procedure to survey these aspects that the spatial units for study are deliberately determined.

With regard to it, an administration unit of ward area (about 30–50km² in dimensions) is useless, even though it is most convenient for availing various statistic data. The main subjects of urban planning on this scale are usually the problems of car-traffication (network of roads) and land use (zoning regulation).

The researchers and planners in urban planning study often adopt another concept on spatial unity, namely community area, to seek the base of urban planning of residential districts. (“Neighborhood Unit” is used as a technical term in Japan in this sense.) This unit is about 0.5–1.5km² in dimensions and about 8,000–12,000 dwellers in population. But the concept of community area, too, is inadequately larger and heterogeneous area to survey the problems discussed in this paper. The concept may be rather useful for another face of environmental problem in residential areas, such as evaluation on sufficiency of the urban service facilities for resident’s demand, shops, amusement place, and others, or the planning designation of municipal public services for residents, such as public hall, library, school and others.

There can be found no consolidated units ideally or practically smaller than the areas of community concept. The spatial units for the survey on this theme requires its nature to be homogeneous on the housing manner and to be mentally perceived an unity on it by residents’ mind. On this reason, this study adopts the survey units of the residential block surrounded by streets, which usually contains 20–40 dwellings of separated type houses in it and the size of which is mostly a square of 70–100 meters length (about 1 hectare or more). These blocks are presumed in this paper as the basic units of minimum size to from the local environmental conditions for the dwellers, and any kind of plannings to improve these conditions must be founded on them. These will be temporarily called as the residential quarters in this paper.

THE PROCESS OF TRANSFORMATION AND THE SPATIAL COMPONENTS OF PRESENT RESIDENTIAL QUARTERS

The process of transformation of residential quarters

Every peculiar aspect of living conditions in the three types of residential districts stated above, surely evinced the fact that most of the important problems in living conditions are finally ascribed to the style of a dwelling house itself. This is especially true in the problems relating to insufficient supply of floor space for dweller's various living functions.

It can be certainly recognized by all the studies on this theme that even if the shortage of the number of rooms can be resolved by the multipurpose uses of them in the case of "tatami" mat floor style in Japanese dwellings, the scantiness of total floor space makes the living functions uncomfortable and it enforced this status more severely that each living space is captured by the settled home furnishings which are impossible to move or to remove momentarily in the time of room usage conversion.

With regard to these insufficiency of floor space supply, various living conditions have been formed in each of the suburban residential areas by temporarily prevailing style of dwelling houses in every period of the new suburban expansion in metropolis. Similarly, it is a matter of course in time sequence that the changes of living conditions are brought by the alternation of house type in established built-up areas on which this paper is studying. On this aspect of alternation, some popularized patterns may be observed in recent transformations of Japanese urban areas as follows.

The standard pre-war residential areas in Japanese metropolises had held its original nature in its suburban expansions and had been filled up with wooden made and individually independent dwelling houses with one or two stories which respectively equip about 300-350m² of their residential lot. Such character had not been so greatly modified till about 1955 when the surprising population increase started on Japanese metropolises.

The modification toward the diminution of the size of dwellings has been developed rapidly after then mainly through the following four courses, until the every residential district has been fully occupied by the three types of over-crowded dwelling manners stated above. These courses of transformation, as well as the original status, will be illustrated again with the figures of practice in sampled typical quarters of wards area (Fig. 5).

(1) A relatively spacious lot, which had been originally attributed to a dwelling house, was divided into several lots, and compact houses of separated type were built respectively in the divided lots (Fig. 5, 1 type).

(2) A vacant lot, remained in built-up area, was filled up with one or more mokuchin type apartments, wooden made multiple dwellings of two stories, or with a mansion type apartment, concrete-made multiple dwellings architecture of many stories. (Fig. 5, 2 type)

(3) An old relatively big dwelling house was replaced by one or more mokuchin type apartment (Fig. 5, 3 type).

(4) A wooden-made small apartment or a few separated compact houses were in the open space of a residential lot surrounding an original dwelling house (Fig. 5, 4 type).

All of these processes brought into the properly low density residential districts, accompanied with the elevation of population density, the problem of the over-density in housing manner or over-contraction of individual dwelling houses.

Geographical concerns on the theme till today tend to be satisfied, by tracing the areal increasing patterns of population densities, with an assumption that high population density must unquestionably bring about the deterioration of living conditions in urban

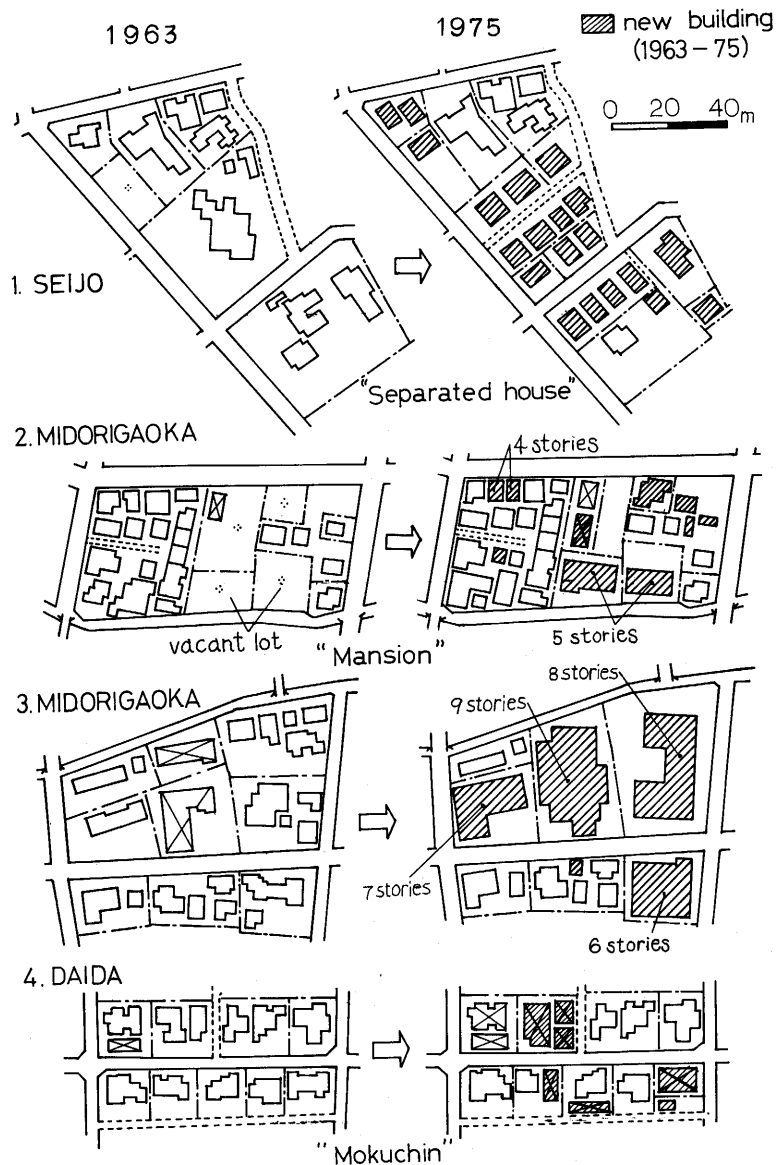


Fig. 5 Typical courses of transformation of residential quarters

residential areas through the factor of the compactness in unit size of dwellings. But it should be argued that a little more detailed analysis is required for the more satisfactory understanding on the status of living conditions in the present Japanese residential areas. This complies with the special necessity of the studies on the dwellers' behaviors in these over-crowded residential areas.

The spatial components of present residential quarters

Careful attentions on the dwellers' behaviors may lead the problem of necessity on the

conceptual re-examination of the constitution of spatial components in a residential quarter as a whole. This further means more practically the necessity of the remark on the functions of the out-door space surrounding each individual dwelling house. The reasons of these requirements are evinced in the fact that considerable parts of dwellers' living functions, contained the functions properly fulfilled within each floor space, can be flown out into the out-door spaces from the floor spaces of their own dwelling houses, in proportion to each size.

From this point of view, both the public spaces and the private lots of individual dwelling houses are customarily conceived in the studies till today. Especially private lot has apparently attended to the deep concerns because of its intensive combination to the private floor space. These functions being flown out into the out-door spaces will contain miscellaneous ones in present Japanese residential quarters; for the illustrations, domestic works which are pushed out from the poor space of kitchen utilities, children's playings which are shutted out from the narrow family living rooms, and such other many functions as listed up in Table 4.

But in practice, the present transformation of Japanese urban residential areas has produced the contraction of the private lots similarly as the shrinking of private floor space in dwelling units. Consequently, the properly private open spaces surrounding the

Table 4 Dwellers' living functions observed in the outdoor spaces

Function	Practical behaviors and utensils		
		(private space)	
		Aggregating in a place	Segregating respectively
parking		automobile, automobile, bicycle, bicycle	<i>baby carriage, child's tricycle</i>
storing		<i>furniture, play-things, other utensils</i>	gradening tools, other daily tools
domestic work	clotheshorse, drying place, <i>sink</i>	<i>wash tub, electric washing machine, clothes pole</i>	sweeping tools, bottles, <i>boxes</i>
fueling		fuel gasometer, fuel oil tank	<i>stockpile of other fuel</i>
treatment	refuse heap, dust-burner, dustbin, purifier		<i>lumber room (place)</i>
working	car washing, <i>handicraft, carpentering</i>		<i>repairing, maintenance</i>
taste & rest	sunbath	flower box, pot plant	gardening, <i>rearing pets</i>
play playing	(children, adults)		
association	talking standing, meeting		
traffic	access road (stoppage or parking for a time, walking, cycling)		
announcement	notice board, sign		

Italics — function flowing out into outdoor space

every dwelling house of separated type tend to be used commonly to each other by the neighboring dwellers in many cases. Therefore, an apprehension on the practical utilizing manners of open spaces surrounding dwelling houses is a matter of great importance to speculate the present living conditions, especially on the compactness of living space, in present Japanese urban residential areas.

Here an important concept on the third category of spatial component, the common space, must be proposed in this paper, and the re-examination of its utilizing manners also must be requested task in it. The work will contain the research on what spaces are used in what manners in common by neighboring families. Probably some of the environmental problems of other categories than compactness of living space, such as shading of sun shines or obstructing of wind circulations, will be reasonably contained by the concept of the common space in the residential quarters.

OPEN SPACES COMMONLY USED IN RESIDENTIAL QUARTERS

It may be ascertained in above discussions that the space of residential quarters is conceptually composed of the privately used spaces, commonly used spaces, and spaces for public use, including the housing spaces themselves. This section will be particularly related to the practical status of the common space which has not been satisfactorily analysed in the past studies. But the practical status of the sizes and using manners of common spaces are locally much diversified by the manners of housing in such various factors as planningly or traditionally grown housings separated or multiple type of dwellings, high density or low density housing, and so on.

Here the illustration will be given by five sample (over-) crowded residential quarters which respectively represent the typical style in each using manner of common space.

TAGARA (the residential quarter of individually separated dwelling houses, Fig. 6-1, 7)

The dwellings in TAGARA were mostly developed freely on each plan of the owner residents after the early 1960's, and the small patches of farm lands have still remained in mosaic pattern inserted to the quarter of a group of these dwellings. Here the houses, all individually separated, made of wood and with one or two stories, are respectively equipped with about 73m² of a housing lot and about 50-60m² of a total floor space on average. In this quarter, these housing manners have brought in the residential densities of about 125 dwellings/ha or 400 peoples/ha in their coarse estimations.

The whole of the housing space but a few exceptional parts can be divided into the individual dweller's own spaces for private uses, on these relatively spacious characters in the circumscriptions, in Japan. These lots, individually propertied by each dweller, are separated from each other clearly with fences on lot boundaries. Though such the outdoor spaces may not be satisfactorily spacious for all the necessities, yet these can offer the open spaces for the dweller's individual plans to accommodate any type of the domestic necessities which are overflowed out of the floor space of each dwelling. In the quarter of this type, only the land pieces like blind alleys, which have still been divisionally owned by the residents, consist in such commonly used spaces for the dwellers surrounding them on some purposes as the access roads to their dwellings, children playing yards, communicating yards of neighboring residents and so on.

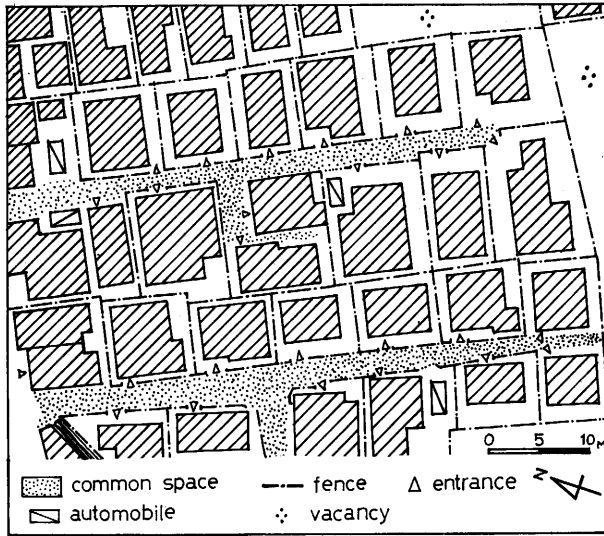


Fig. 6-1 Various utilizations of outdoor spaces in TAGARA

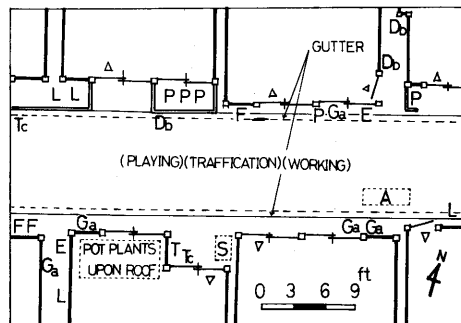


Fig. 6-2 Various utilizations of outdoor spaces in NISHIMIZUE

- | | | | |
|----------------|---------------|------------------------------|---------------------|
| B; bicycle. | Tc; tricycle. | A; autobicycle. | Bc; baby carriage. |
| L; lumbers. | Po; pot. | E; electric washing machine. | |
| S; sink | Wt; washtub. | ☯P; cloths pole. | Ga; fuel gasometer. |
| Bo; box. | Db; dustbin. | ---; fence & hedge. | Bi; birdcage |
| F; flower bed. | P; plant pot. | =; concrete fence | |
| △; entrance | | | |

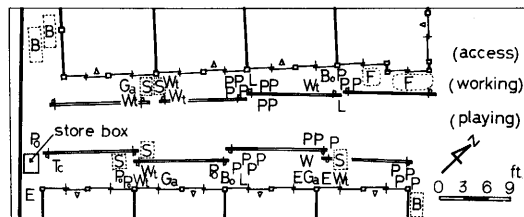


Fig. 6-3 Various utilizations of outdoor spaces in KYOJIMA

Indexes are shown in Fig. 6-2

NISHIMIZUE (the commixed quarter with the collective housings by housing enterprises and the small factories, Fig. 6-2, 7)

The dwelling houses, intermingled with small factories, were collectively constructed by the housing supply enterprises to sell in the latter half of 1960's. The separated dwelling houses in unified style are prevailingly built in a form of the wooden-made dwellings of two stories, accompanied with the total floor space of 50-60m² and the housing lot of only 53m² on average. The density of dwellings is estimated at, as considerably higher than TAGARA, 170 dwellings/ha or 600 peoples/ha.

Even if the percentage of housing space against the space of the lot is regulated in this quarters to be less than 60%, the extreme compactness of the absolute size of the lot makes the divisional use of the outdoor space quite difficult, because of their too narrow size of the each outdoor space. The figure shows that many of dwelling houses are not enclosed with fences, and the tiny outdoor spaces intervening the houses are used commonly by neighboring dwellers on such purposes as lumber storing space, parking space for bicycles and so on. The space for children playing, clothes drying, sun bath and so on, further encroaches on the alley spaces which form the common use spaces inseparably from the outdoor space stated above. This encroachment converts the alleys for the originally public utility as streets into the commonly used space for each other's domestic function of the neighboring families. Contrary to the case of TAGARA, only the very partial outdoor space, that is the spaces under the eaves of each dwelling house, is differentiatedly used for the specialized plan by each dweller.

KYOJIMA (the row-houses, linearly conjuncted dwellings of "nagaya" style in Japanese sense, Fig. 6-3, 7)

The dwellings in the quarter have still maintained a traditional Japanese style of dwelling houses which had been once prevailed in the down-town districts in the feudal cities. They are called nagaya style in Japanese. The various light-industries are distributed in this older style of down-town residential districts which developed in the 1910's, as raised the combined usage of the houses for both purposes of the dwelling and working place. The nagaya style dwellings in this quarter are, commonly to its usual cases, wooden-made row-houses of a single story and the 3-5 tenement units are conjuncted under its long linear roof. Each dwelling unit is extremely compacted as only about 25m² of the floor space, but its structural character of the spatial component is rather similar to that of the independent separated houses than to that of the modern mokuchin style apartment. Such row-houses, conjuncting the dwelling units, have filled up this quarter, quite intensively and with quite disordered arrangement. Because of the extreme compactness of the floor spaces in their dwelling units and of the commissions of the side open spaces in surroundings of the dwellings which the separated type houses as TAGARA and NISHIMIZUE are, equipped with the density of the dwellings is higher than the above two, that is, about 200 dwellings/ha or 700 peoples/ha notwithstanding the simple formation in their vertical extensions.

This style of dwelling units consequently lacks the two dimension of open spaces beside them (excepting the two terminals of the linear conjunction). The private open space of each unit is provided only with the front open spaces of every dwelling unit, in which the dwellers make a practice of doing something such as washing clothes, drying the washed clothes, parking a bicycle, parking child's tricycle or baby carriage, storing goods, putting flower and plant pots and so on. But these front yards are usually so narrow strips as 1-2m in width that these are conjoined without fences to the alley style access roads, where the

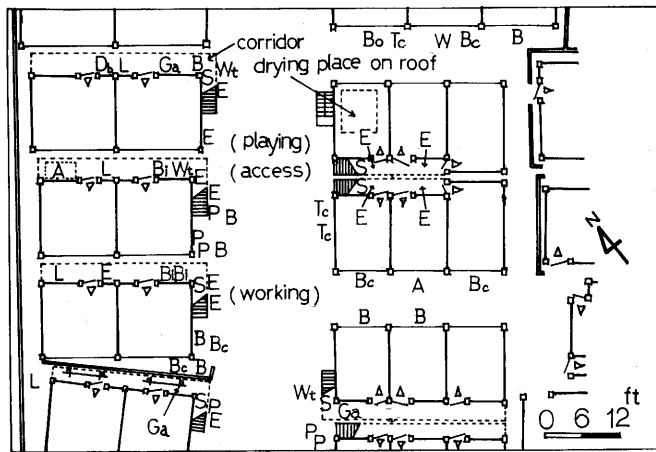


Fig. 6-4 Various utilizations of outdoor spaces in KITAMACHI
 Indexes are shown in Fig. 6-2

outflows from the private spaces are behaved in common use manners. The usages of the alleys (or so-called "roji" in Japanese), which are extending like a maze among houses, are similar to in the case of NISHIMIZUE, and the common uses of them are furthermore promoted in such the alleys as they are not capable for passing automobile because of their extreme narrowance and their sharp curving.

KITAMACHI (the assembling quarter of the mokuchin style apartments, Fig. 6-4, 7)

The present aspects in the quarter came into appearance in the 1960's, and the small patches of farm lands have still remained in mosaic pattern. Several groups of the mokuchin style apartments were built by the various sorts of the dwelling suppliers, who were house makers, dwelling dealers, land owners and a part of proper dwellers. All of these suppliers of renting dwellings on small scale funds have built mokuchin style apartments favorably, because this style could provide the largest number of dwelling units for renting at the smallest cost for building and in the smallest size of housing lot. This fact necessarily brought about the most compacted floor spaces and outdoor open spaces of the dwelling units, which were estimated at about 10-15m² in the total floor space and 9-13m² of housing lot per a dwelling unit on the average in this quarter. Thus the highest density of dwellings among the five sample areas in this quarter is estimated at about 500-600 dwelling units/ha and 1,700 peoples/ha or more.

These average sizes of dwellings, usually being composed of only one or two rooms, are evidently too compact for the dwellers, who in accustomed manner consist of one adult in minimum and a couple with two children in maximum per a unit. Therefore it may be easily imagined that they tend to bring out their domestic necessities, which require the spaces, into the outdoor spaces as much as possible. In practice, such domestic necessities as are achieved in the front yards in the case of KYOJIMA cannot but be performed in the roofed outdoor corridors, which are originally furnished for the purpose of the common access routes for plural dwelling units. Further, since the common use on access routes for dwelling units could not be omitted from the utilizing manners of the space of corridor perfectly, any space has not remained in corridors for such the necessities as are behaved in the alleys in the case of KYOJIMA. Necessarily, the functions, such as bicycle parking

and dustbin keeping, have to be brought out commonly into the public space, for example, the roads. Thus the private demands on spaces tend to encroach on the spaces which are properly laid out for common uses in this style of apartments and the rejected common uses further encroach on the spaces which are prepared for public use in this quarter.

MIDORIGAOKA (the residential quarter containing mansion style apartments, Fig. 6-5, 7)

The original aspect in this quarter was somewhat similar to that in TAGARA on its nature of dwelling houses. The impact on the building-up of the quarter emerged certainly in the readjustment work of farm lands and accomplished adjustment plan of new streets pattern in 1920's. But the quarter had still preserved in the latter half of 1960's the two vacant lots respectively of 400m² and of 520m². In 1969-70, the two mansion style apartments, which contained the 43 dwelling units in total of the both, were built on the two vacant lots respectively, so that the density of dwelling units in the quarter unexpectedly rised as the twice as the former, that is, from about 120 dwellings/ha to 230 dwellings/ha in their coarse estimations. With regard to the mansion style apartments alone in this quarter, the scales of the dwelling units in them are reasonably unified into relatively spacious sizes of 45-50m², while the housing lot per a dwelling unit remains only 16-27m² because of their vertical extension of five stories building. (After then, the recent mansion style apartments tend to be built higher, such as 8-15 stories.) In this manner, the mansion style apartments in this quarter keep the rather large size of dwelling units in the five sample quarters and also indicate the heighest density of dwellers in them, next to mokuchin apartments in KITAMACHI, as 1,200 peoples/ha and 450 dwellings/ha or more.

The designation of mansion style apartments denotes originally, in their lay-out, discriminated utilization of the two types of outdoor spaces, that is, private use and common use. Such private uses of outdoor spaces as viewed in the above samples, are enforced for the dwellers to restrictedly complete in the balcony spaces which are attributed to each dwelling unit. Excepting these balcony spaces of about 4-6m² in extent, only a

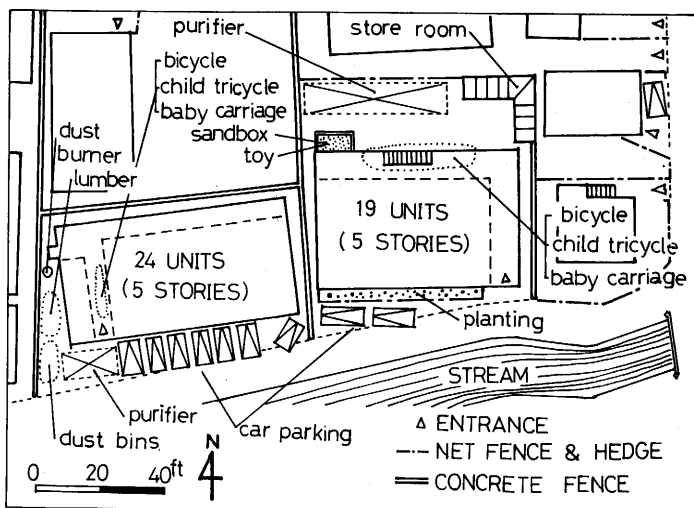


Fig. 6-5 Various utilizations of outdoor spaces in MIDORIGAOKA

type of outdoor space for private use is provided in a form of automobile parking spaces which are rented to the several dwellers. All the rests of outdoor open spaces, including the corridors, stair steps, entrance hall and the whole housing lot on ground, are designed for common use and such designation is well appraised by dwellers owing to their not too extreme insufficiency of indoor spaces.

Table 5 Outdoor spaces for the fulfilment of dwellers' living functions

living function	TAGARA	NISHIMIZUE	KYOJIMA	KITAMACHI	MIDORIGAOKA
fence	mostly enclosed	partly enclosed	nothing	nothing	nothing
parking	under the eaves*	under the eaves*	under the eaves*	under the eaves*	parking space
storing	storehouse, under the eaves	under the eaves	under the eaves	outdoor corridor, under the eaves	each balcony, lum- ber rooms
domestic work	open space in a lot, under the eaves	between the houses, under the eaves	frontage, under the eaves	outdoor corridor, under the eaves	balcony
fueling	storehouse, under the eaves	under the eaves	under the eaves	outdoor corridor, under the eaves	(balcony)
treatment	open space in a lot, under the eaves	between the houses, under the eaves	under the eaves	outdoor corridor, under the eaves	balcony, dustbin station
working	open space in a lot, on the front road	on the front road	on the front road, (frontage)	on the road	balcony, open space in a lot
taste & rest	front & back yard, under the eaves	front roadside, on or under eaves	frontage, under the eaves	under the eaves front roadside	balcony, open space in a lot
playing	front & back yard on the road	on the road	frontage, on the road	on the road	playlot, open space in a lot
association	on the road	on the road	on the road	on the road, outdoor corridor	open space in a lot, on the road
announcement	roadside	roadside	roadside	roadside	roadside, entrance
traffic & access	blind alley (walk)	alley (walk)	mazy alley (walk)	alley (walk)	street (walk & car)

* parking except for automobile

Fig. 6-1—Fig. 6-5, illustrate the constitution of the three components of outdoor spaces in the five sample quarters of different types referred above. The increase of dwellings densities produces the correlative contractions of both types of spaces, the indoor spaces and the outdoor spaces. These contractions are crudely proportional, excepting the mansion style apartments, of which indoor spaces are reversely expanded to the decrease in the size of housing lot per a dwelling unit. It is a matter of respected subject in this paper that the decrease of outdoor spaces tends to cause the conversion of the utilizing manner of them, from private use to common use (Table 5). The critical status of the private use of the outdoor space appears to be lying on between 125 dwellings/ha (or 73m² in the size of housing lot) in TAGARA and 170 dwellings/ha (or 53m² in the responding value) in NISHIMIZUE. In the case of more than 200 dwellings/ha as KYOJIMA, most parts of the privately owned outdoor spaces are occupied by various types of common usages, and in the case of the residential quarter filled up with mokuchin style apartments as KITAMACHI, the space for common use begins to entrench the public space on the grade of more than 500 dwellings/ha. The case of mansion style apartments demonstrates the quite defferent nature to the above succession, though the density of dwellings amounts to more than 450 dwellings/ha (dwelling units per the housing lot).

Thus the over-crowded dwellings in Japanese urban residential districts can be realized

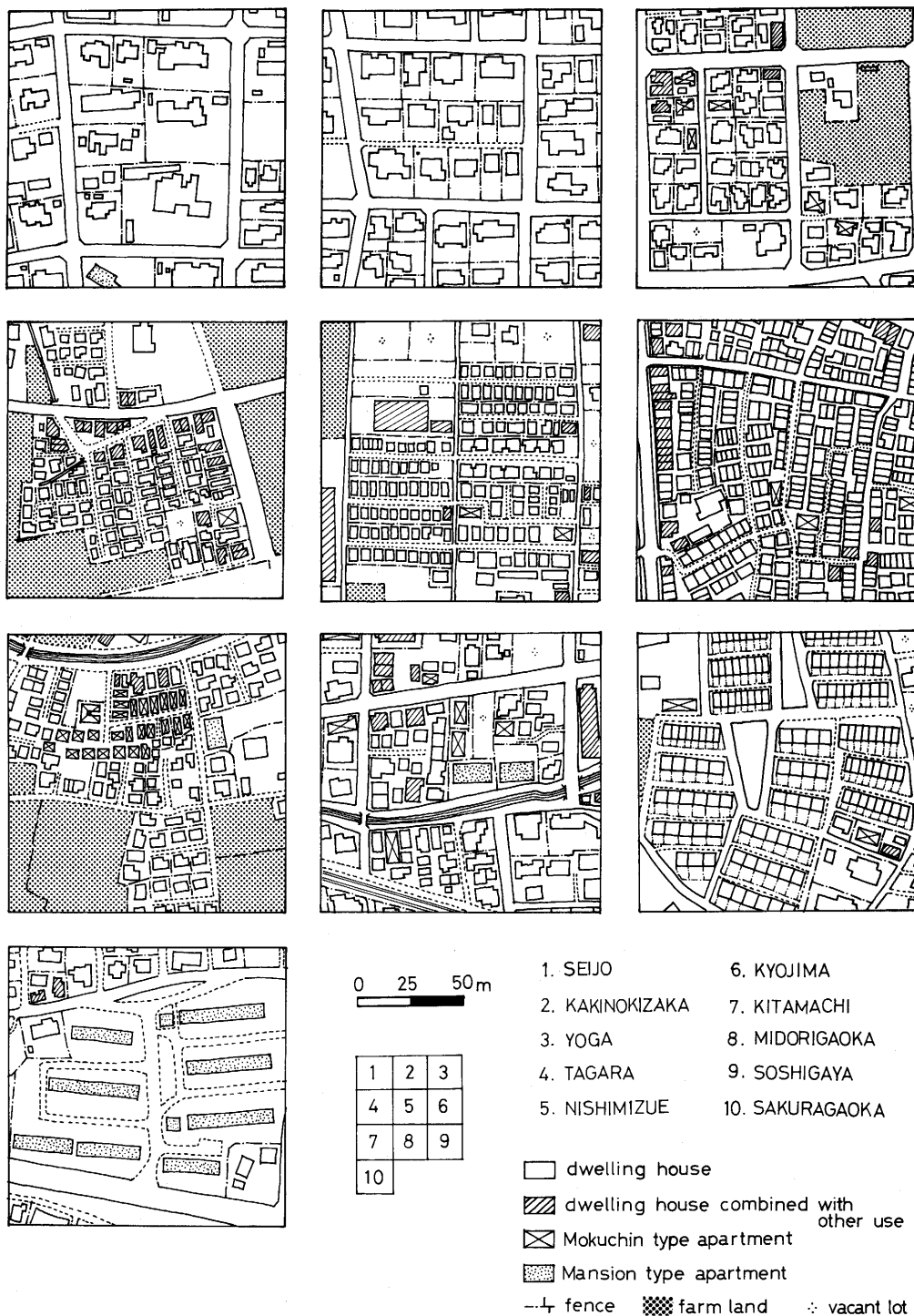


Fig. 7 Typical quarters in metropolitan residential areas

Table 6 Outdoor spaces for the fulfilment of dwellers' living functions

Quarter	Size of lot (sq. meters)	Housing type	Outline of quarter
1 SEIJO	1000 or more	separated house	high class residential quarter
2 KAKINOKIZAKA	300 500	separated house	middle class residential quarter
3 YOGA	100 180	separated house	general (class) residential quarter
4 TAGARA	60 100	separated house	sprawled district in 1960's
5 NISHIMIZUE	50 60	separated house	sprawled district in 1960's
6 KYOJIMA	30 50*	row-house	inner circle of wards area
7 KITAMACHI	14 17*	mokuchin apartment	sprawled district in 1960's
8 MIDORIGAOKA	50 55*	mansion apartment	district filled up with mansion (5 stories)
9 SOSHIGAYA	40 70*	row-house	public housing (TOKYO housing authorities)
10 SAKURAGAOKA	53 55*	multiple dwellings	public housing (housing corporation)

* size of one dwelling unit

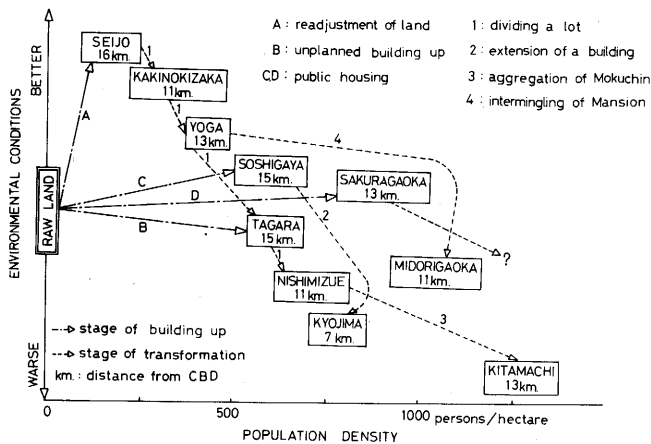


Fig. 8 Symbolic model of the transformations of residential quarters

through the introducing of a devisal, that is, the not desirable but inevitable devisal on private use of the outdoor spaces under each eave in indoor-like manner and common use of the outdoor open spaces by neighboring dwellers.

THE RECENT TRANSFORMATION OF THE RESIDENTIAL DISTRICT IN JAPANESE METROPOLITAN CITY

The above analysis clarified the present status of Japanese urban residential areas in which various types of residential districts produce the respectively peculiar aspects on the density of dwellings, that is, the constitution of the spaces and followingly the conditions of residential lives. The formation of these districts into the whole residential area will be shortly referred in this section finally.

Fig. 7 manifests the some variations of the residential quarters found in the residential districts of Tokyo which include the five typical samples used in the above observations on common use spaces (Table 6). These variations should not be considered as the fixed ones independent to each other, but some of them can well illustrate the practical courses of the transformation in residential areas viewed in present Japanese metropolises. As regards this theme, even though all the variations logically hold the potentiality to transfer to each other, the accustomed courses of the transformation have been restricted within some of them. Fig. 8 symbolizes, using the samples of the present variations of residential quarters in Fig. 7, the standardized transformations which have prevailingly emerged in recent Tokyo. The resultant aspects of these transformations have been already referred in the section II and IV. Here only the general patterns of the changes are arranged from a viewpoint of the constitution of the residential district as a whole. Some of the residential quarters, such as SEIJO, have still left the proper style of Japanese urban dwellings which had once dominatedly covered the whole residential districts of Tokyo till about the first half of 1950's. But the changes, shown with arrow lines in the figure (Fig. 8), frequently occurred, including those described in the section IV, on place by place with various local impacts and on the motives in the chronological changes of the situations of original dwellers. Some quarters, which are newly developed in recent years, tended to adopt the types on the mid-course of the changes since their starting stages in various periods. The reverse course of the arrow line has never happened at least till today. On such ways, the colors of the residential districts as a whole have transferred year by year from the types on the left upper corner in the figure to those on the right below corner, which imply the deterioration of dwellers' living conditions. The majority of residential quarters appear to have already been occupied by the five types on the right below side in the figure. Such assumption is not only fitted to our empirical observations but also may be assured by the distribution of average net population densities surveyed on the Suginami ward area (-ku area) in the western Tokyo. (Watanabe, 1975)

CONCLUSION

Some analyses are made on the recent changes in the residential districts in a Japanese metropolitan city, Tokyo, and as well, some references are offered on the transformation of the residential area as a whole. The present changes in the ready established residential districts in Japanese metropolises have brought about not only the contractions of the floor space in every dwelling, but also the changes of the spatial components of outdoor spaces, accompanied with the decrease of its total outdoor spaces in the residential quarters. In spite of the conceptual idea that the dwellings must be secured with a sufficient indoor spaces and also with a useful private outdoor spaces, the practical changes of the residential area toward the higher density of dwellings seem to raise the growing domination

of common uses of outdoor spaces by neighboring dwellers, until such common uses by neighborings have invaded the public spaces in their extreme cases. Yet these changes have happened, everywhere in the residential districts of Tokyo, through some peculiar courses and with some inherent resultant types, to Japanese society. Through these courses, the living conditions in Japanese urban residential districts may verge toward the deterioration again on a different face to the measurable shortage of living spaces. The troubles in this sense tend to emerge apparently on the environmental problems in the category of mutual relations of neighboring dwellings. One of the modernized solutions of the problems appears to be the vertical expansion of dwellings on the deliberate architectural plan, such as the mansion style multiple dwellings. But the arbitrary constructions of these mansion style apartments in the older style of residential areas, which usually consists of wooden-made separated houses of one or two stories, bring again the another sort of environmental deterioration on adjacent residential quarters, such as the interceptions of sun shine and sun light, the obstructions of wind circuit and such other, if they are promoted unless the adequate planning of these capacities and layout of open spaces in the housing lots in particular. It might be added, the recent mansion style apartments tend to be built more largely than above samples. Therefore, it may be possibly desirable that Japanese metropolitan cities have grown since the latter half of 1950's, accompanied with the expansions of built-up areas, the increase of dwelling densities, and the intensification and increase of other functions than dwelling. But from the viewpoint of living conditions, in the majority of cases the living conditions in Japanese urban residential districts may verge to the deterioration as a whole through those courses stated above.

These analyses in this paper are accomplished on the extreme mini-scale surveys on the surveying units of residential quarters, or the minimum size of residential blocks circumscribed by the streets. The writer believes that the further development of this type of microscopic study will be quite necessary for the geographers preceding to conclude the general pattern of residential areas in Japanese urban areas, or to discuss the environmental problems in them.

ACKNOWLEDGMENT

The writer wishes to express his gratitude to Associate Professor Dr. Y. Watanabe, Department of Geography, Tokyo Metropolitan University and Professor Dr. K. Kawana, Department of Technology, Tokyo Metropolitan University for their kindful guidance and advice.

REFERENCES CITED

- Kawana, K. (1972): *Urban planning*. 1st ed. Taimeido, Tokyo, 155-167*.
- Nakabayashi, I. (1973): Study of the components of outdoor spaces and the living behaviors of neighboring dwellers. *Toshi Kenkyu Repts. Tokyo Metrop. Univ.* 31, 113-137*.
- Takamizawa, K. (1973): Study of the ready established built-up areas. *Toshi Kenkyu Repts. Tokyo Metrop. Univ.* 31, 39-81*.
- Watanabe, Y. (1972): Some aspects of recent Japanese metropolitan growth. *Geogr. Repts. Tokyo Metrop. Univ.* 6/7, 51-62.**
- , Miyachi, S. (1975): Population density of the residential district in Tokyo. *Tohoku Geogr. Assoc.* 27-3, 154-155*.
- Yamaga, S. (1967): *Study of Tokyo Metropolitan Area*. 1st ed. Taimeido, Tokyo, 41-48.*
- (* in Japanese, ** in English)