

Dynamics of Urban Land Use in Terms of Land Price ; Comparative Analysis of Major Cities in U.S.A. and Japan

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ABSTRACT

The relationship of land use and land prices is examined through comparative analysis of major cities, taking an example of Osaka and Chicago respectively.

key words

land use land price real land price Osaka Chicago

1 Introduction

This paper is concerned with the relationship between land use and land prices through comparative analysis of major cities in U.S.A. and Japan. Emphasis is given on changing land use with urban growth, particularly in terms of land prices. The author takes Osaka and Chicago as an example for the analysis, because of the similarity of size and of employment structure. (Fig.1)

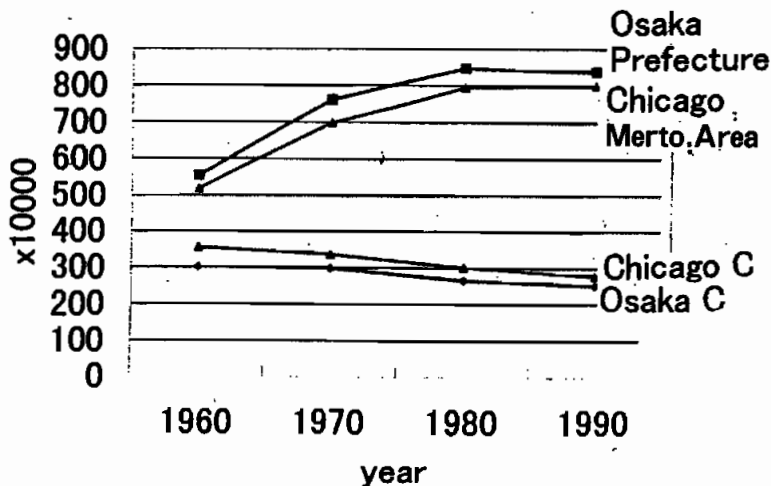


Fig.1 population change

Here, the author sets up a concept "real land price". A real land price is meant by a return reduction land price or net profit per area divided by interest rate. He considers savings (including investments besides deposits) as the potential power of residential area. Given the existing land price curve; if the real land price of some firms' /residents' area is below the existing one, they may move out as far as the both ones meet. Say factory B may move out as far as B' point. On the contrary the situation is reversed, they may approach the civic center where the both prices meet. Say bank A may be centripetal to A' point. The difference between the two prices makes the change of land use. (Fig.2)

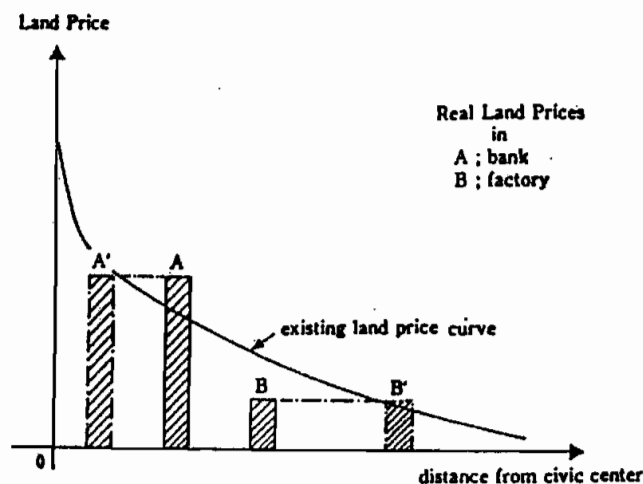


Fig.2 The concept of land use change based by the author' idea

2 The Case of Japanese Major City—Osaka—

Osaka City, Osaka Prefecture, and Osaka Metropolitan Area with 2.5mil., 8.4mil., and 16mil. of population respectively in 1990 have experienced an bombastic urban growth particularly in their 60' and 70' backed by the high economic growth. Osaka Prefecture accepted more than 2 millions of population in its '60 stimulated by high investments, which brought enormous amount of land use change and also issued such serious urban problem as making of uncontrolled, congested, disordered built-up areas so called 'Urban Sprawl' (Fig.3)

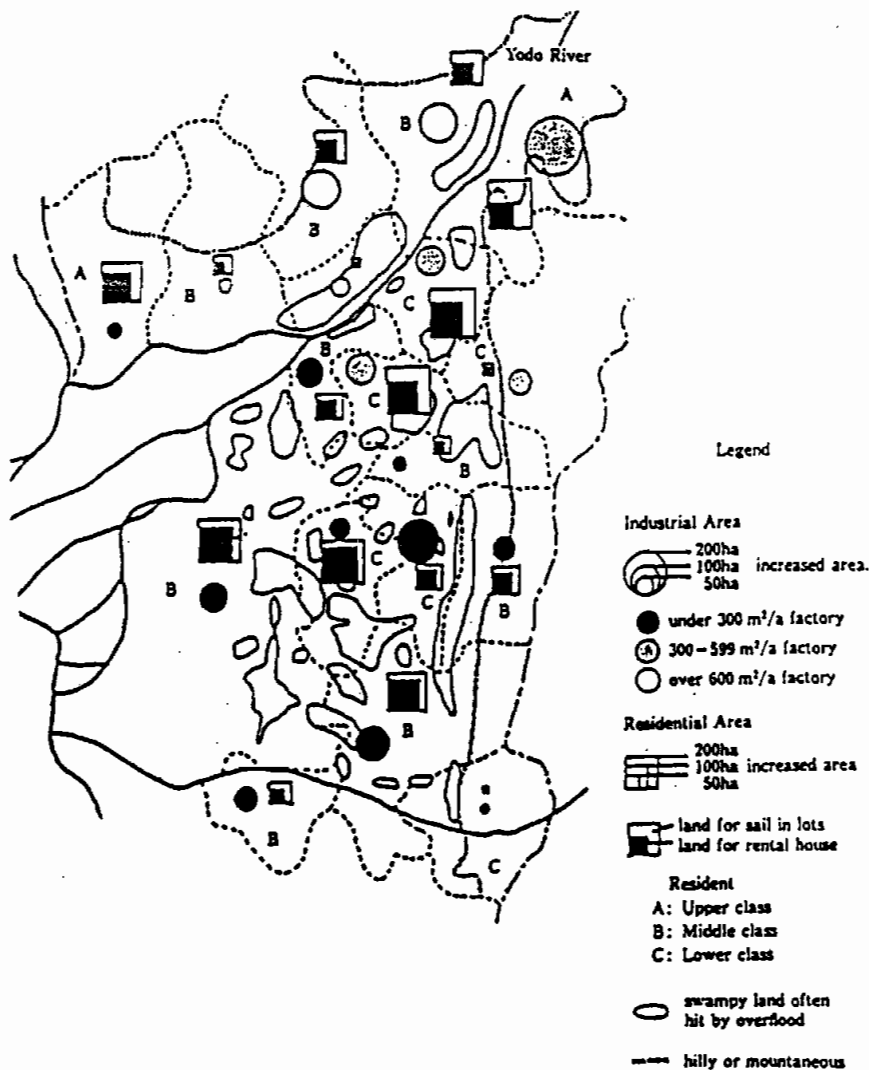


Fig.3 Urbanization of the Osaka Metropolitan area, 1960-1964

A potential economic power of land or "real land price" of each form of land use is obtained as follows;

- 1) The real land price of the business center was represented by that of banks (this is only data of bank to estimate net profit in this area)

The real land price of bank area ; (sum of deposit X 0.006) per area ÷ 0.05 (interest rate 5%)

(after cost analysis by Association of Japanese City Bank)

- 2) The real land price of commercial areas; (sum of sale X 0.02) per area ÷ 0.05

(interest rate 5%)

(after cost analysis by Ministry of International Trade and Industry)

- 3) The real land price of industrial areas;
 $[(\text{value added}) - \text{wages}) - (\text{other costs})] \div 0.05(\text{interest rate } 5\%)$
 (after same above)
- 4) The real land price of residential area;
 $(\text{household income} - \text{expenditure}) \text{ per ground area of the house } \div 0.05$
 (interest rate 5%) (Fig.4)

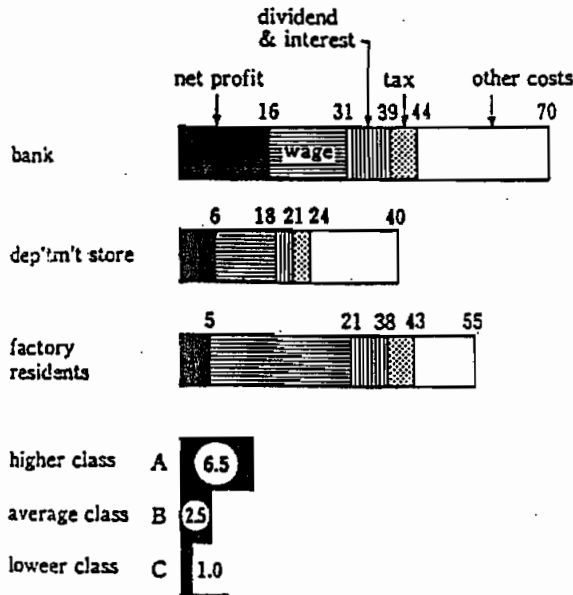


Fig.4 The source of real land price

A comparison of real land price is made with the existing ones. The following results are obtained;

- 1) Banks and department stores lead the price of land and their influence on land pricing has so great that we can even see their new location at best spots in the C. B. D. or near sub-civic centers on the fringe of the C.B. D..
- 2) Theoretically selection of individual residential sites is determined by the land user's ability to pay land rent. This means that location of new dwellers may be decided where real land price of them meets existing one.

Actually those with higher income live in or move to favourable places like hilly and sunny area with abundant of greenery to live, and those with average income live in or move to less favourable areas where the land is low, damp, sometimes in the danger of denudation or the air is polluted. Those with lower income living in rental houses have to endure the worst of housing conditions. (Fig4,5,6)

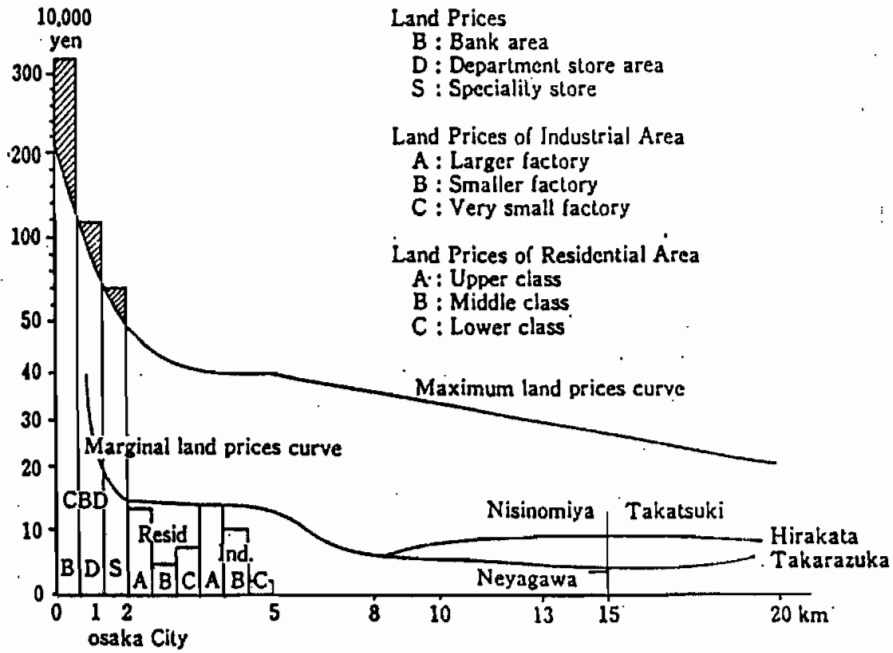


Fig.5 Land prices curve in the Osaka Metropolitan area

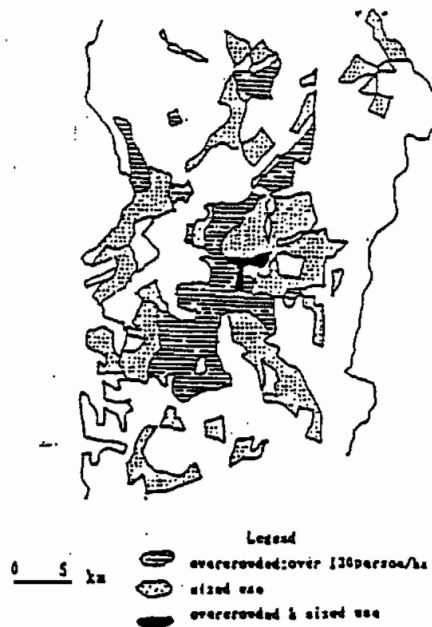
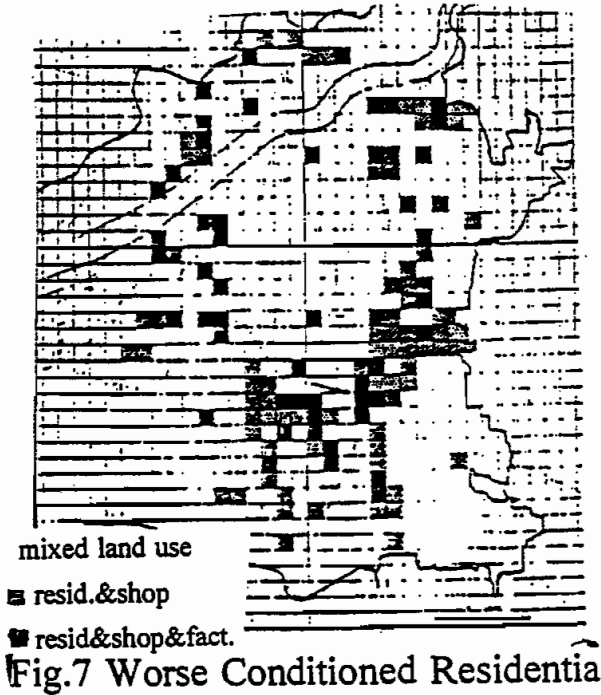
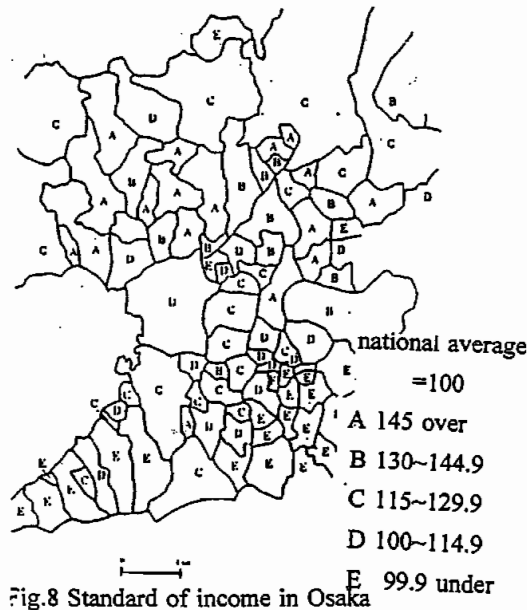


Fig.6 Overcrowded Residential Area in Osaka.

Extremely poor families gather around the inner Loop Line in the downtown area. Their depressed financial condition makes escape from these areas nearly impossible, logically owing to land user's ability to pay land rent. (Fig.7)



With the increase of income level residents with higher incomes move out to the suburbs, so that the income level of the residents relatively declines in the downtown area. Per capita of Osaka City dropped from B level to D level during 1964-1975. (Fig.8)



3) Concerning the location of industry, most of the factories have moved out of the mother city to find sites where real land prices of industrial area meet the existing ones. Actually not a small number of larger factories have expanded across the plain on the right bank of Yodo River, where JR and super high way services are available, while many smaller ones move to the eastern suburban area considered to be a less favourable location. (Fig.4)

Due to the decline of investments evoked by the Oil Shock in 1973, the tempo of urbanization in Osaka Metropolitan Area has been relatively milder, particularly in the change of industrial use from arable land; From 1971 to 1970 average quantity of the change to industrial use from arable land fell down to only 15% of that of 1960. (Fig.9)

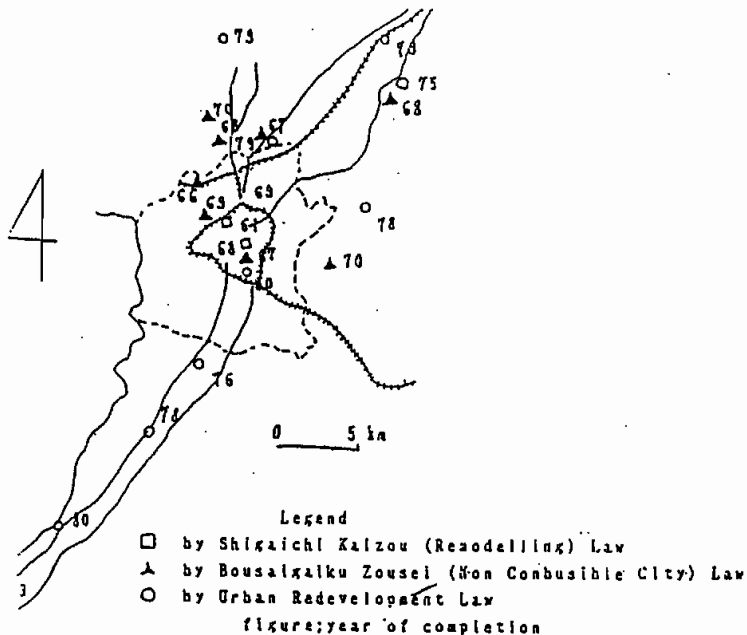


Fig.9 Urban Redevelopment Projects in Osaka Metropolitan Area

Since 1970 the urban sprawl has been improved. Urban redevelopment Projects have been implemented; About one fourth of the newly built up area was controlled by these projects.

After 1985 the area experienced unbelievable soaring of price of land, which brought a fairly big change for the use of land. Here the author tried another analysis of Osaka Metropolitan Area in 1988. The following revealed;

1) Talking of commercial area, real land price both of banks and department stores which had been land price leader, became far below the existing land price. Since 1975, new construction of these facilities shifted the location from down town Osaka to near

suburbs in relation to urban redevelopment projects.

2) With continuous segregation of living place by socio-economic class, rate of house ownership still have diminished; also, there has been increasing rate of 'pseudo' land ownership among land owners (only sharing with many residents of high rise accommodations).

3) Concerning the industry, with a continuous exodus from the mother city to suburban area, only such industry creating higher value added per area as printing and electrical product making industry barely newly located periferi/environs the mother city. where the both land prices meet. (Fig.10)

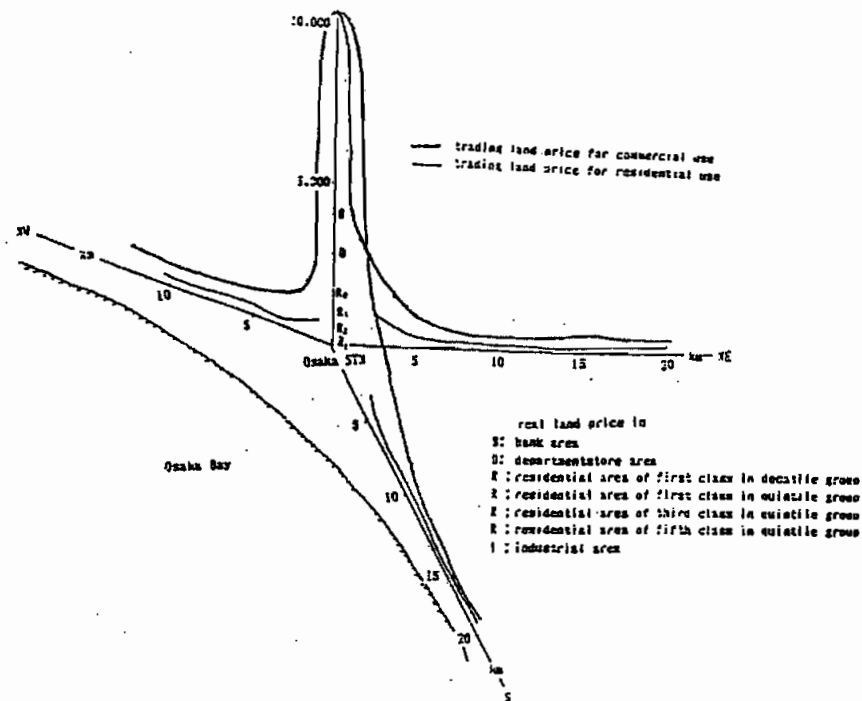


Fig .10 Land price curve in Osaka Metropolitan Area (1988)

Now there has been little land use change since bubble economy collapsed; there is a slight change in the construction of houses. Construction of high rise apartment houses has been active around periferi area of mother city owing to easier acquisition of land by the plunging of land prices.

3 The Case of U.S. City —Chicago—

Chicago is the biggest city in Mid West of U.S.; population of City of Chicago has 2.78 million, and that of Chicago Metropolitan Area has 8.06 million. It gained a lot of population after World War . Particularly between 1960 and 1980 it accepted about 3 millions of population ,while city of Chicago lost more than half million of population during the period. So, there has been rapid land use change in suburban areas.(Fig.11)

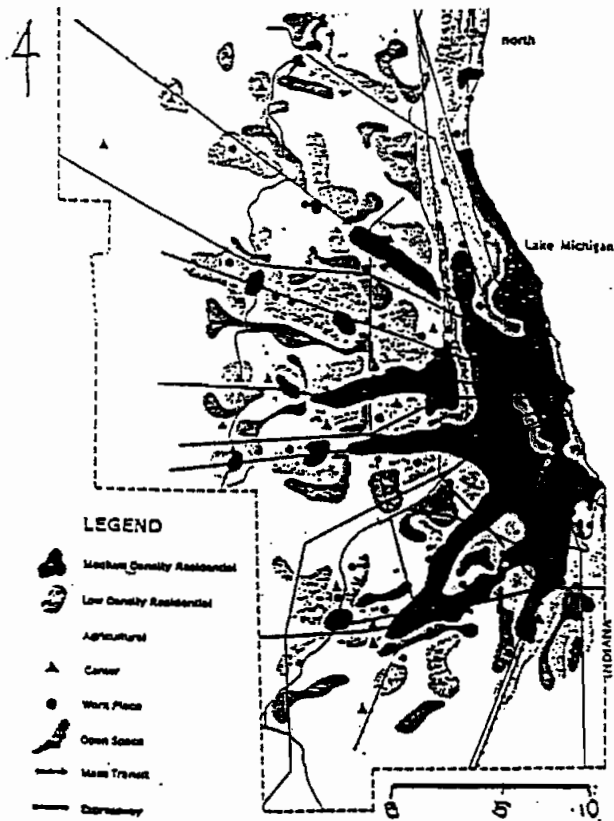


Fig.11 The "Finger Plan" for the future development of the Chicago area as proposed by the Northeastern Illinois Planning Commission in the late 1960s. (Map, courtesy Northeastern Illinois Planning Commission.) after Cutler "Chicago" p.176

Only statistics on value added by industry for industrial areas ,sum of both retails and wholesales for commercial areas and sum of bank's deposits for the business areas, and individual income by class are available to estimate real land prices. Consequently calculation of real land price is made as follows:

1) land prices of commercial area;

$$\frac{(\text{sum of retail sales X } 0.02) + (\text{sum of wholesale sales X } 0.01)}{(\text{ground area of commercial area X } 0.5) \text{ X } 0.1}$$

,where the interest rate is set at 10%,and the occupancy rate of area related to sales is set at 50% in whole commercial areas.

(after Cost Analysis of the U.S.Bureau of the Commerce)

2) land prices of industrial areas

$$\frac{(\text{sum of value added}) \text{ X } 0.25}{(\text{ground area of industrial area}) \text{ X } 0.1}$$

,where the interest rate is set at 10%.

(after same above)

3) land price of residential area

$$\frac{(\text{sum of income}) \text{ X } 0.1}{150 \text{ X } 0.1}$$

,where saving(deposits & investments) rate 10% of income and interest rate 10%

After the comparison of real land prices with the existing ones,the following can be concluded

(Fig.12)

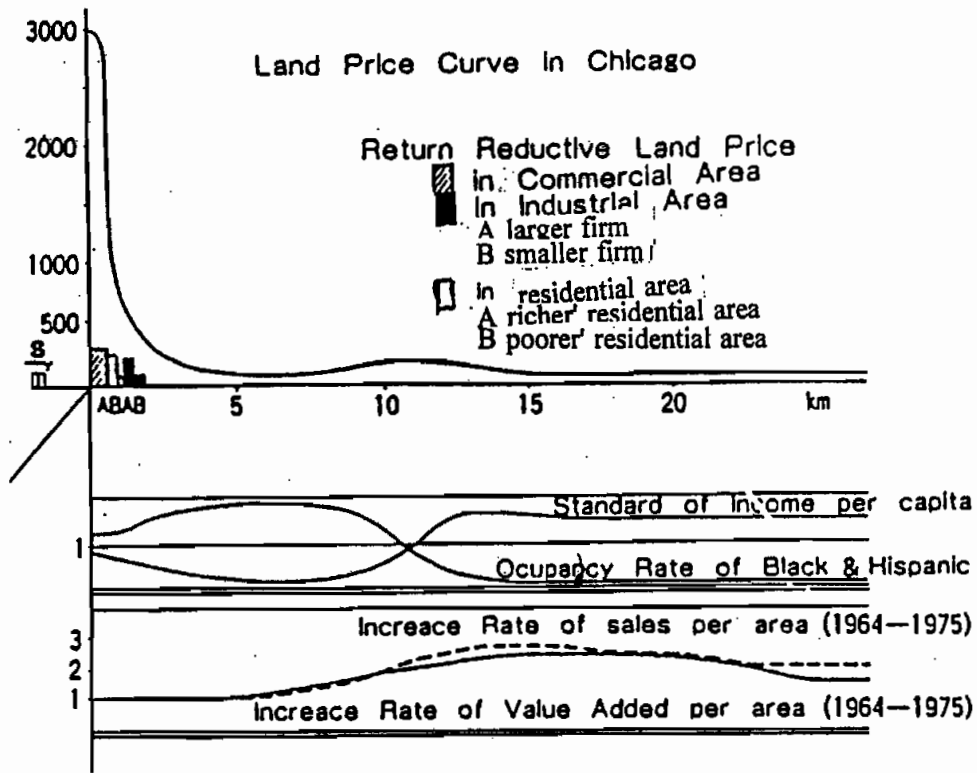


Fig.12 Land price curve and socio-economic indicators in Chicago.

1) Both newly built shopping stores and factories are located primarily in the areas where each real land price and existing one meets. Actually, the firms providing job opportunities move out to the suburbs together with those with higher incomes, who have much purchasing ability; newly built stores and factories locate where upper middle class residents live. So, this fact caused the decrease both in employment and in sales in down town area. (Fig.13,14)

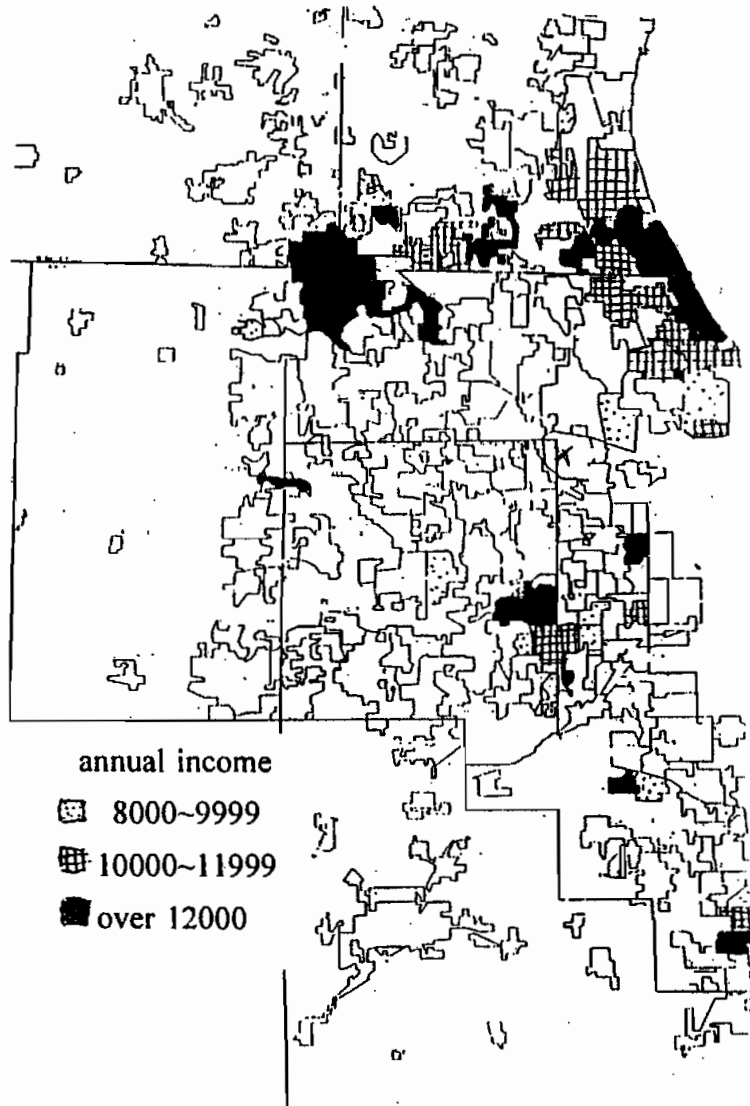
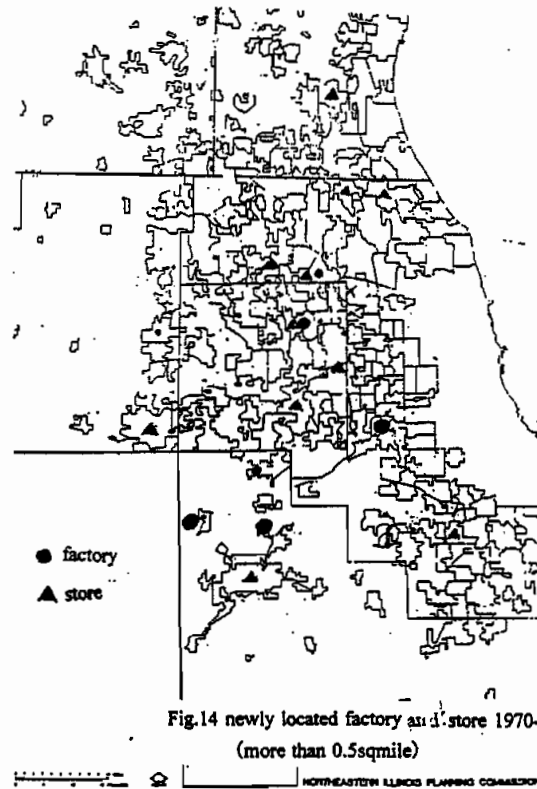


Fig. 13 Distribution of upper middle class
in Northeastern ILLinois 1974



2) Most of the minorities like African American and Hispanics are confined to the C.B.D. or just expand gradually to near suburbs along with the public transit routes. ; Their average income is almost half of the Whites. They are even less likely than whites to move outside their own community. These facts owe to the land user's ability to pay land rent. (Fig.11,15)

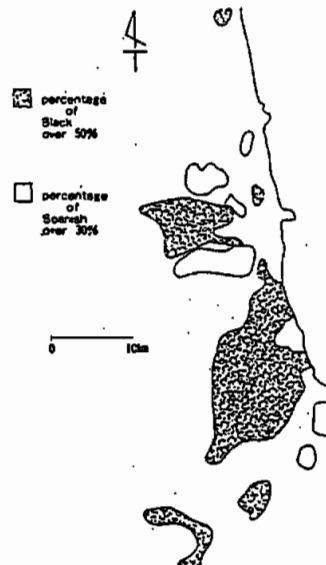


Fig.15 Ethnic Domain in Chicago Metropolitan Area

4 Concluding Remarks

Gradient of bid rent curve of Chicago is more sharp in down town area. This means that there are many skyscrapers in down town area, but from C.B.D. to suburban fringe there stretch a flat, at most 2-3 story, buildings, while in Osaka Metropolitan Area there is more mixed land use in the C.B.D. and its environs.

In both Metropolitan Areas many factories, stores and even offices are likely to move out to suburban areas. However jobs is still increasing in the mother city of Osaka due to a fairly large number of new entry of firms while City of Chicago losing the employments.

Here the author has the following conclusion in relation to land use in terms of land prices;

- 1) these changes of land use basically obey the rule of the ability of land user to pay land rent, which suggests a segregation of living place by the residents' economic status.
- 2) offices, stores, and factories move out to the point where land prices and the existing land prices meet according to the law of profit maximization.

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