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Transition Analyses on Land Use and Land Price in Nagoya CBD during the Deregulation Decade

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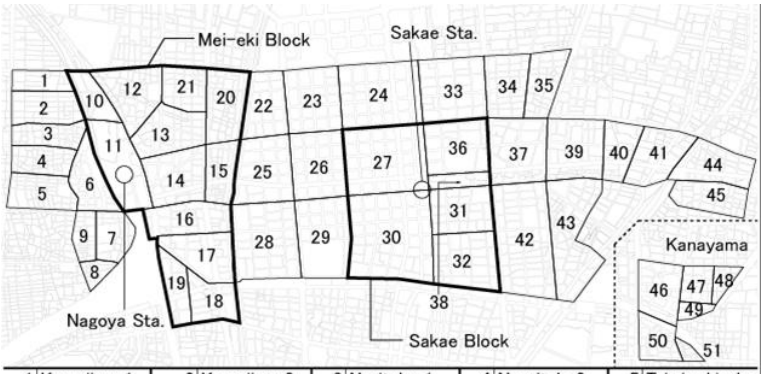
1 ABSTRACT

Following the examples of the United States and Western Europe, from around 2000 Japan has adopted a neo-liberal urban policy with the deregulation of downtown and a consequent encouragement of investment to this area. In April 2002, the Act on Special Measures Concerning Urban Reconstruction was enacted, and since then, intensions of landuse and land prices have drastically changed. This study refers to the first decade of the 2000's and analyzes the transitions of the CBD (Central Business District) of Nagoya, Japan as an example. Nagoya CBD locates on the center of the third largest metropolitan area in Japan with over 5 million people as well as Nagoya City with a population of 2.15 million.

In this article, we firstly give an overview of actual landuse trends between December 2001 and December 2006. Next, we deal with a comparative analysis of the especially retail agglomeration of the Meieki and Sakae cores within the Nagoya CBD in the 2000s, then show the actual state and changes of land prices in 2001 and 2006. Finally, we analyze of landuse change factors in the 2000s by analyzing and comparing data of landuse and land prices.

2 RESEARCH BACKGROUND, RESEARCH OBJECTIVES AND ITS COMPOSITION

Following the example of the United States and Western Europe, from around 2000 Japan has adopted a neo-liberal urban center policy with the deregulation of downtown and a consequent encouragement of investment to this area (Allmendinger, 2002). This study refers to this time as the "Urban Regeneration Period" and analyzes the transitions to the structure in the Nagoya CBD (Central Business District) as an example case; it is the 3rd largest metropolitan area in Japan with over 5 million people, and contains Nagoya City with a population of 2.15 million.



1	Kamejima 1	2	Kamejima 2	3	Noritake 1	4	Naoritake2	5	Takebashi-cho
6	Tsubaki-cho	7	Taikou 1	8	Taikou 2	9	Taikou3	10	Ushijima-cho
11	Meieki 1	12	Meieki 2	13	Meieki 3	14	Meieki4	15	Meieki5
16	Meiekiminami 1	17	Meiekiminami 2	18	Meiekiminami 3	19	Meieki-minami4	20	Nagono1
21	Nagono 2	22	Marunouchi 1	23	Marunouchi 2	24	Marunouchi3	25	Nishiki1
26	Nishiki2	27	Nishiki3	28	Sakae1	29	Sakae2	30	Sakae3
31	Sakae4	32	Sakae5	33	Izumi1	34	Izumi2	35	Izumi3
36	Higashisakura1	37	Higashisalura2	38	*see bellow	39	Aoi1	40	Aoi2
41	Aoi3	42	Shinsakae1	43	Shinsakae2	44	Uchiyama3	45	Imaike1
46	Kanayama1	47	Kanayama2	48	Kanayama3	49	Kanayama4	50	Kanayama-cho1
51	Kanayama-cho2	No.	area Name	38 is include Hisaya-cho、Buhei-cho、Shinsakaemachi、Toushin-cho					

Fig. 1: Precincts (cho-me) in Nagoya CBD

The Nagoya CBD has two main retail and office cores: an area around Nagoya Station (hereinafter referred to as Meieki); and an area around Sakae Station (hereinafter referred to as Sakae). In particular, the Sakae core has historically been considered the center of the CBD, but in 1999, the completion of a giant bulding complex above Nagoya Station, named the JR Central Towers, consisting of retail, office and hotel floors with 200,000 sq. meters had been a turning point for the city, and the development at the Meieki core

attracted many investments. In April 2002, the Act on Special Measures Concerning Urban Reconstruction was enacted, and since then, a variety of landuses and their land prices have increased in the both cores. As a result, Meieki enjoyed a period of strong growth and mass-media reported that Meieki would pull ahead of Sakae during the 2000's. Such kinds of a boom with the drastic transition had been going on until they were finally depressed by the world financial crisis of 2007, as well as Tokyo.

In accordance with the divisions made by a office marketing report into the Nagoya CBD, the survey target area was defined as the 51 chome or precincts with a total area of approximately 560 ha (Fig. 1). They include around Meieki, Sakae, and Kanayama where is far a few kilometers south from the two cores, and also include the Designated Area of the Masterplan of City Center Vitalization, and the High-Priority Development Area in the Urban Regeneration Zone and so on.

The components of this paper is as follows. Section 3 gives an overview of actual landuse transitions between December 2001 and December 2006. Section 4 is a comparative analysis of the retail structure of Meieki and Sakae during the 2000's. Section 5 analyses the changes and the actual state of the land prices in 2001 and 2006, and Section 6 explores the characteristics of landuse changes in the Nagoya CBD in the decade of deregulation by comparing and analyzing data of landuse and land prices.

3 ANALYSIS OF LANDUSE IN THE NAGOYA CBD

3.1 Employed for Analysis on Floor Use

To aggregate floor areas amounts for each use in 2001 and 2006, the following three types of data were taken from the "Present Status: Building Use Survey" in Urban Planning Basic Survey published by Nagoya City: 1) building area; 2) the number of stories (excluding basement floors); and 3) building use category. Concerning the mixed use buildings, the floor area was calculated proportionally taking into consideration the relation of the widest and others; in this regard, for buildings with a total floor area exceeding 10,000 sq. meters, the aggregated results were verified by using the Zenrin Residential Map. Floor areas were calculated 61 subcategories of use and then classified into 7 categories: retail, office, residential, culture and welfare, industrial, hotel, and others.

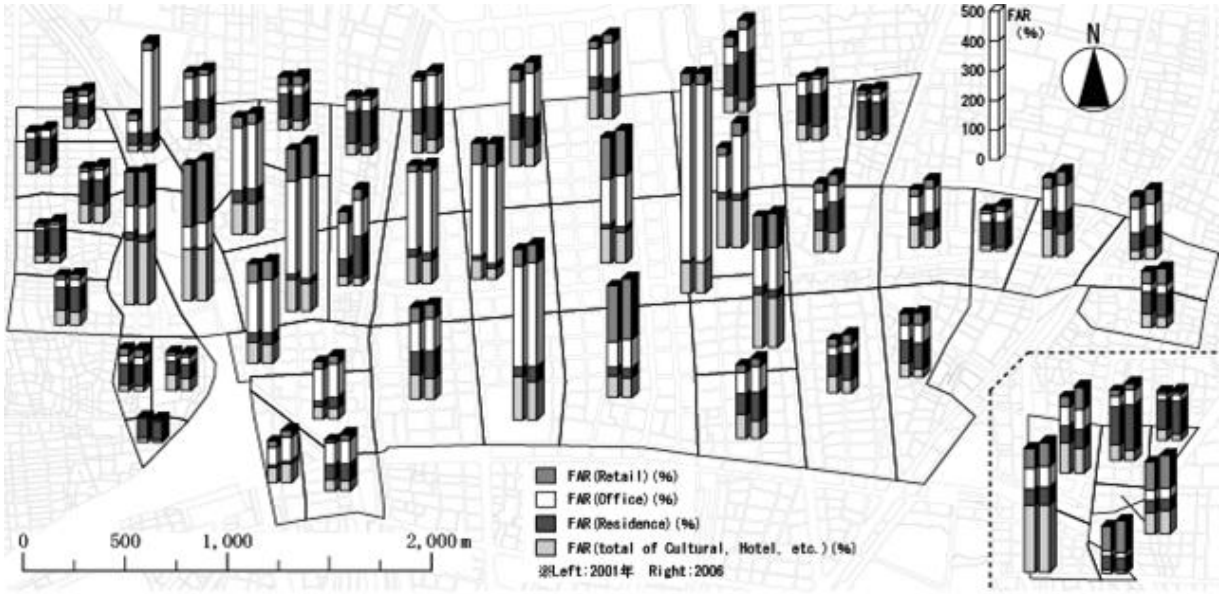


Fig. 2: Comparison between floor area ratios (FARs) in Nagoya CBD from 2001 to 2006

3.2 Transitions of Landuse from 2001 to 2006

Floor-area ratio (FAR) for each use category in each precinct is obtained by dividing the floor area amount of each use category in a precinct by the total area amount of the precinct, in other words, the total sum of blocks within the precinct, excluding Shirakawa Park and all of the roads. The FAR of the whole CBD in 2001 was 287% and in 2006 was 308%, giving a 21% increase (Fig. 2).

When spatial patterns around Meieki and Sakae were examined, the FARs of most precincts were 400% to 500%, and most along the Meieki-Sakae axis were 300% to 400%. However, to the west side of Tsubaki

Town, and the east side of Higashi-Sakura 1-chome, when compared to the Meieki-Sakae axis, many more precincts with FAR of less than 200% were found. The precinct with the highest increase, which was due to redevelopment, was Ushijima Town (245.0%). The next highest increases were found in Higashi-Sakura 1-chome (85.5%), and Meieki 5-chome (77.6%), and in the precincts with FAR of 300% or so, an increase in density was noticeable. The precincts with FAR of 400% or more also showed a 10% to 20% increase, which shows an ongoing rise in the density of the CBD. In contrast, decreasing densities were found in the following three precincts with FAR of 200% or less: Nakono 1-chome, Taiko 1-chome, and Taiko 2-chome.

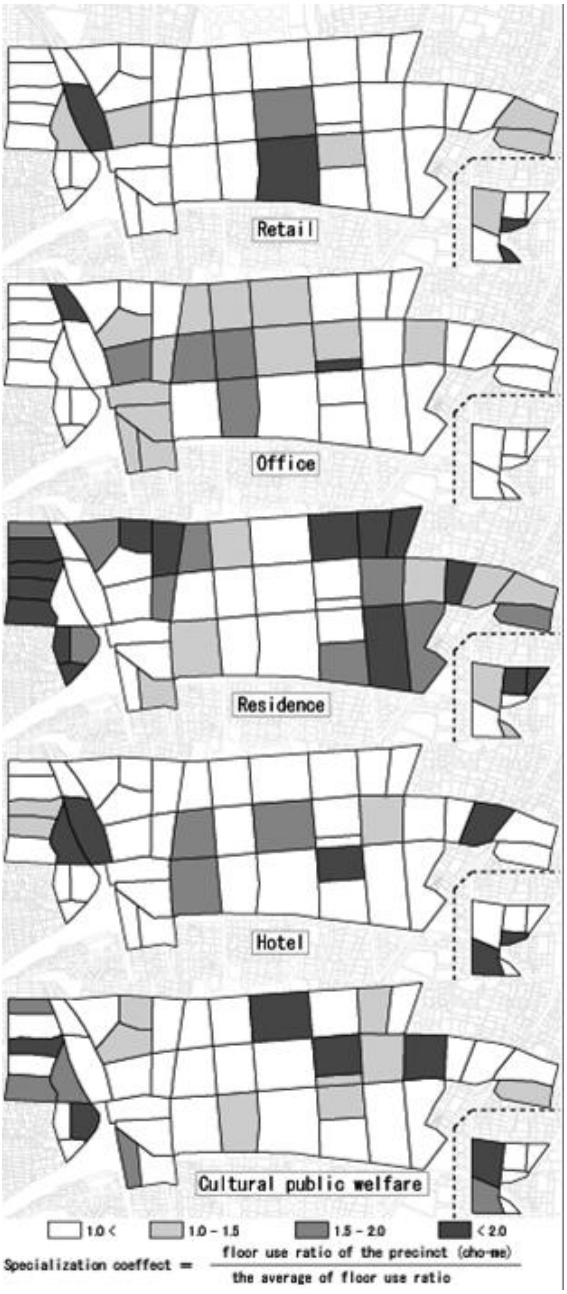


Fig. 3: Spatial patterns of the specialization coefficients in 2006

When examined according to the use category, a 4.4% increase in the retail FAR was found throughout the CBD. Increases in the Kanayama district stand out as seen in the following figures: Kanayama 1-chome (43.3%), Kanayama Town 2-chome (24.7%), and Kanayama 4-chome (17.1%). The increase in the office FAR was 14.7% throughout the CBD, which was larger than retail. When examined by precinct, increases were found in Ushijima Town (240.9%), which was affected by the redevelopment project, Higashi-Sakura 1-chome (74.0%), and Marunouchi 2-chome (36.3%). The office category also showed the tendency to increase in precincts with a high FAR in 2001. Concerning the increase of residential FAR, as seen in Meieki 5-chome (81.6%), Izumi 1-chome (59.5%), and Higashi-Sakura 2-chome (30.4%), many increases were found in precincts with FAR of 100% to 300%.

3.3 Analysis on Specialization of Landuse within Nagoya CBD

To examine the specialization of landuse in each precinct, focus was given to floor use percentages; the result obtained by dividing the floor use percentage of each area by the floor use percentage throughout the CBD was defined as a specialization coefficient, and this value was used (Fig. 3). When the specialization coefficient exceeds 1, this indicates that the land is specialized in the relevant use category. Next, with regard to each use category, areas with a coefficient exceeding 1.0 in 2006 were reviewed.

[Retail] Large values were found in the precincts around Nagoya, Sakae, and Kanayama Stations. Although the coefficient of Meieki 1-chome dropped from 2.44 to 2.37, and that of Sakae 4-chome dropped from 1.39 to 1.36, those of the other 9 areas generally showed an increasing trend of specialization. Particularly, the effect of the commercial complex in Kanayama 1-chome can be seen, where specialization was significantly developed with a coefficient of 1.43, up from 0.73.

[Office] The value was high around the Meieki-Sakae axis. Many with a coefficient of between 1.0 and 2.0 were found, and these form one specialized cluster.

[Residential] In many precincts other than the Meieki-Sakae axis, the value exceeded 2.0, and the pattern shows a reversal of the office trend. However, as seen in Marunouchi 1-chome, areas specialized in both office and residential can be found.

[Hotel] There was the same trend as retail, and high values were found in the precincts around Meieki, but unlike retail, large values are also seen around the precincts specialized in offices, such as Nishiki 1-chome and Sakae 1-chome.

[Cultural and Welfare] It was difficult to find any clear trends; however, high values were found in the precincts specialized in residential, and also in locations that provide easy access, especially around a station.

3.4 Comparison of Landuse Transitions between the Meieki and Sakae Blocks

The Meieki and Sakae blocks were aggregated and the totals were used (Fig. 1) to compare their landuse transitions (Fig. 4). It was found that over this period, offices increased in both blocks, but residential increased mainly in the Meieki block, while retail increased in the Sakae block. However, after the sum total of each block was aggregated, and compared to the grand total of both blocks, no dramatic change was seen in the ratio of Meieki to Sakae, and it was found that the amounts of major landuses had occurred equally in both blocks.

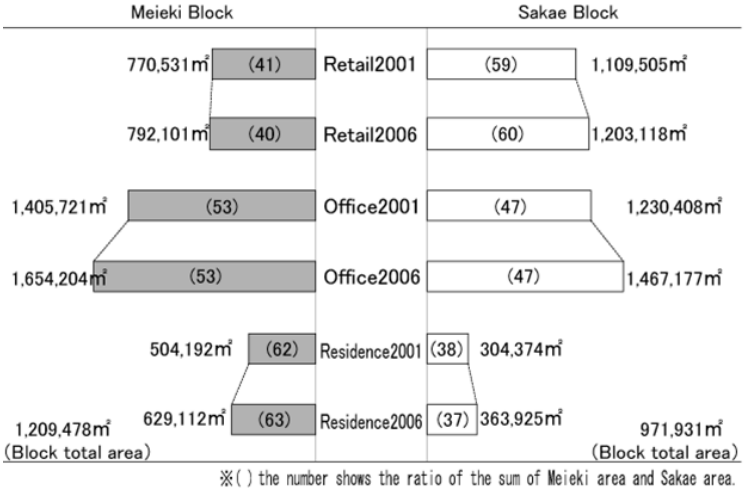


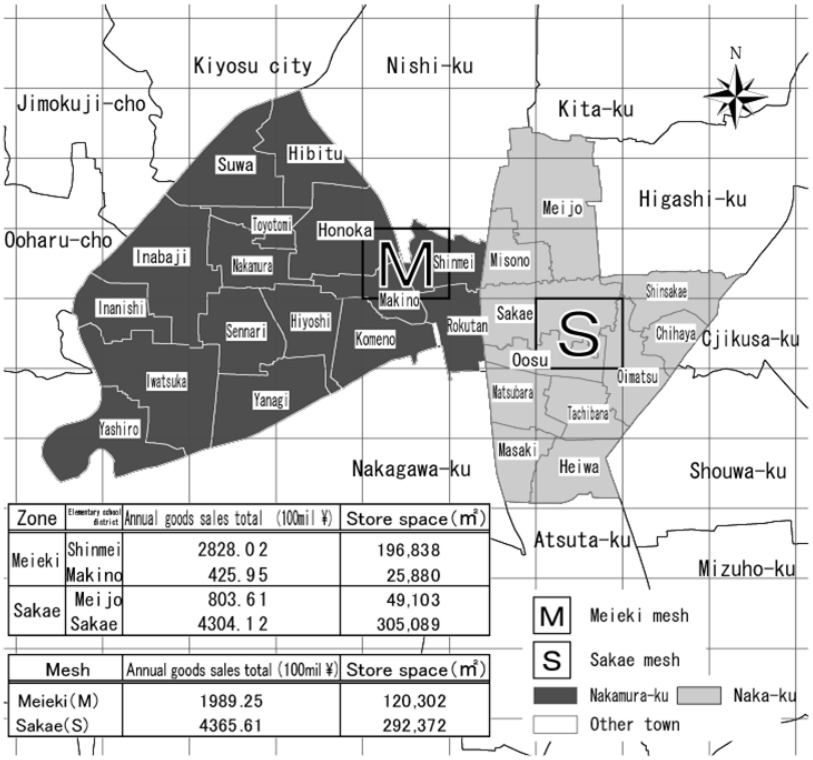
Fig. 4: Comparison of floor amounts between Meieki and Sakae block

4 COMPARISON OF CHANGES BETWEEN THE RETAIL STRUCTURE AOUND MEIEKI AND SAKAE

4.1 Data Employed for Analysis

Regarding changes in the 2000s to the two major retail cores, Meieki and Sakae, a comparative analysis was conducted (Kojima, 2010). The main data used was the Official Commercial Survey of 1997, 2002, and 2009, the National Census of 2005, and the Nationwide General Report of Large-Scale Retail Stores of 2000,

and 2008. In the Official Commercial Survey the Shinmei and Makino elementary school districts in Nakamura Ward were regarded as the Meieki zone, and the Meijo and Sakae elementary school districts were regarded as the Sakae zone, and the combined totals were aggregated (Fig. 5).



Zone	Elementary school district	Annual goods sales total (100mil ¥)	Store space (m²)
Meieki	Shinmei	2828.02	196,838
	Makino	425.95	25,880
Sakae	Meijo	803.61	49,103
	Sakae	4304.12	305,089

Mesh	Annual goods sales total (100mil ¥)	Store space (m²)
Meieki(M)	1989.25	120,302
Sakae(S)	4365.61	292,372

Fig. 5: Outline analysis of retail structure in Nagoya CBD

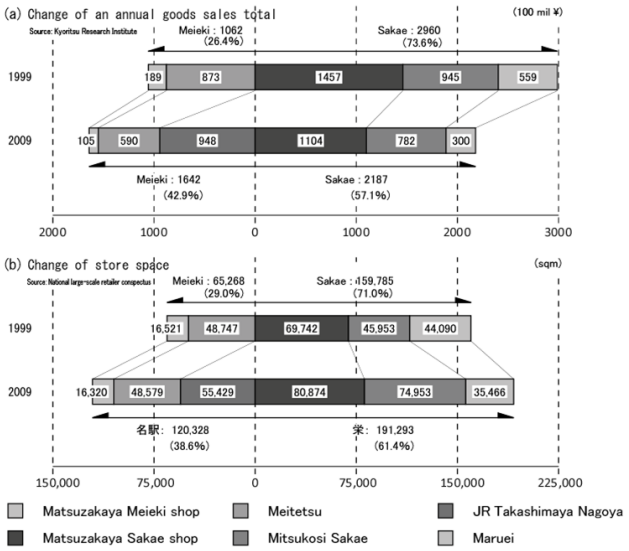


Fig. 6: Transition of the retail structure in the Meieki and Sakae zones

4.2 Transition Analysis on the Retail Structure in the Meieki and Sakae Zones

From 1997 to 2007, the fluctuating increase of retail floor area in both zones resembled a seesaw. Fig. 6 shows changes to the retail over this time, and indicates that the proportion of Meieki had become larger. Concerning the sales amounts, Meieki showed a significant increase, whereas Sakae was stagnant, and in 2007 the share changed to 4 : 6. In these ten years, the floor efficiency value decreased in both zones, which indicates the intensifying competition of this time. Fig. 7 gives data with a focus on large department stores, and the same tendency of significant growth in Meieki and a decrease in sales in Sakae can be found. We can also see that the superiority in the floor efficiency value was reversed silghtly.

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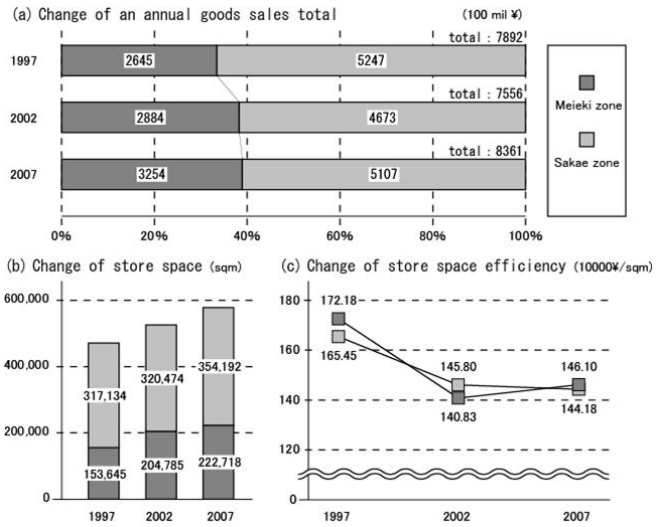

Fig. 7: Transition of the department stores in the Meieki and Sakae zones

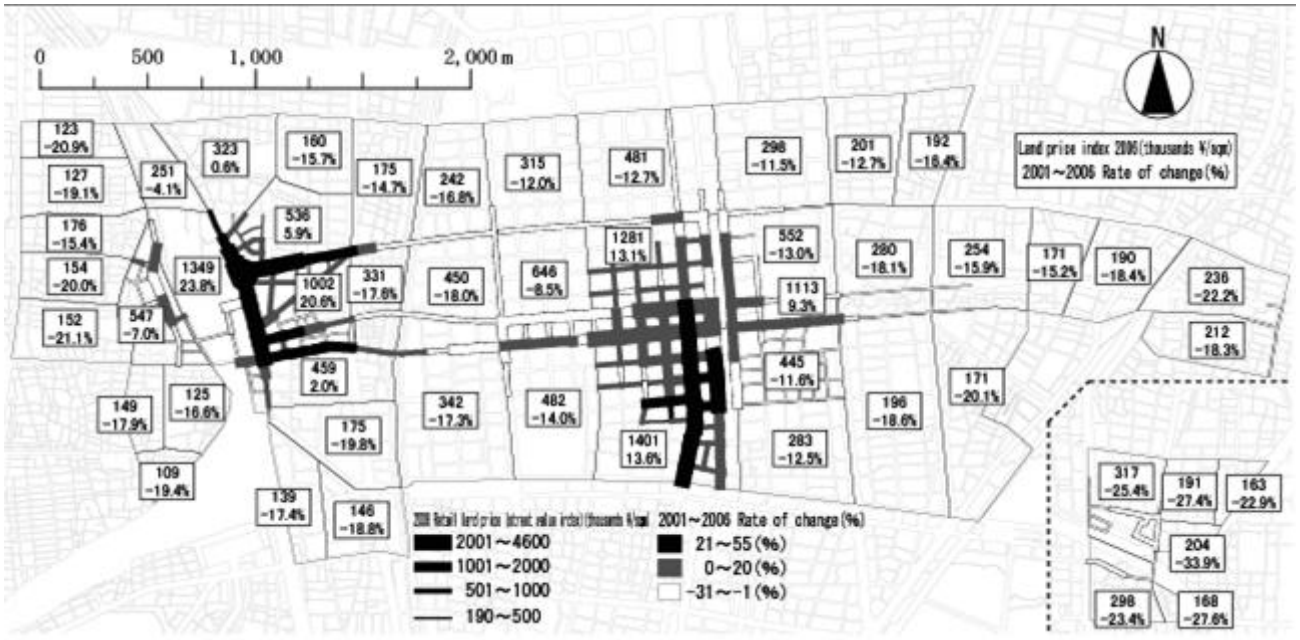

Fig. 8: Spatial patterns of land prices in Nagoya CBD

5 ANALYSIS ON RELATION BETWEEN LANDUSE AND LAND PRICES

5.1 Land Price Indexes as the Data and Their Spatial Patterns

In this analysis Inheritance Tax Street Value Indexes of 2001, 2006 published by the National Tax Agency were used. The street value indexes were classified according to areas, and the CBD there are four categories: advanced commercial, busy shopping street, ordinary combined commercial and residential, and ordinary residential. From among them, street value indexes of both of the advanced commercial and the busy shopping street were composed as a commercial street value index (thousand yen/sq. meters). In addition, as an index to compare land prices in an areal scale, a land price (thousand yen/sq. meters) created based on a arthmetic average of the street links was used. Fig. 8 shows both of the spatial patterns of the above-mentioned retail street value indexes and land prices.

Firstly, high values of the retail street value indexes in 2006 concentrated on major streets such as Meieki Avenue and Otsu Avenue, and their surroundings. Closer to Meieki and Sakae, land prices rise, and in particular, in Meieki Avenue the price rose substantially from 3,240 to 4,600. The highest street value index in the CBD in 2001 was the 3,590 of Otsu Avenue and this value increased to 4,360 in 2006, resulting in Meieki overtaking Sakae for the highest street value index. However, in other streets in the CBD, such as Sakura, Nishiki, Fushimi, and Hirokoji Avenues the retail street value index decreased.

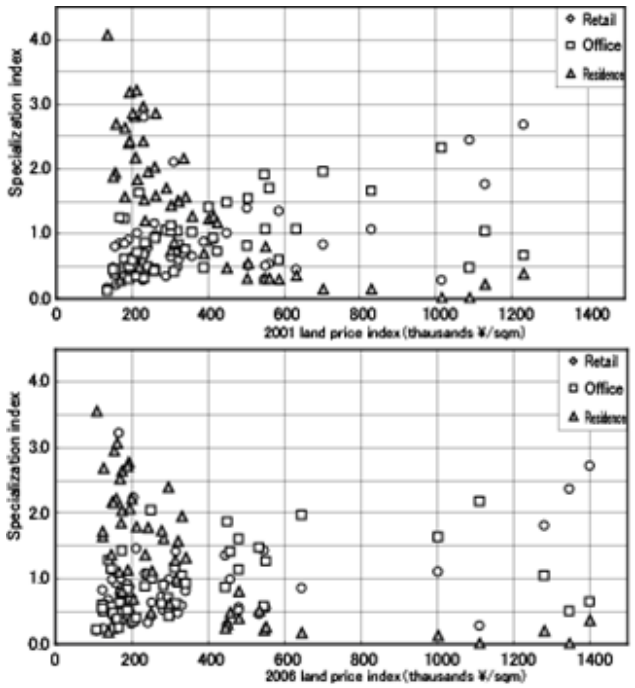

Fig. 9: Relation between Land price index and Specialization index

	Category		Variable
Explained variables	FAR	Y1	FAR 2006(%)
		Y2	FAR 2006(Retail)(%)
		Y3	FAR 2006(Office)(%)
		Y4	FAR 2006(Residence)(%)
	A fluctuated range of FAR	Y5	Change of FAR 2001-2006(%)
		Y6	Change of FAR 2001-2006(Retail)(%)
		Y7	Change of FAR 2001-2006(Office)(%)
		Y8	Change of FAR 2001-2006(Residence)(%)
Candidate variables	Precinct (cho-me) situations	X1	FAR 2001(%)
		X2	FAR 2001(Retail)(%)
		X3	FAR 2001(Office)(%)
		X4	FAR 2001(Residence)(%)
		X5	FAR 2001(Hotel)(%)
		X6	FAR 2001(Cultural public welfare)(%)
		X7	FAR 2001(Factory)(%)
		X8	The density of buildings 2001(number of build./ha)
	Precinct (cho-me) characteristics	X9	Specialization index 2001(Retail)
		X10	Specialization index 2001(Office)
		X11	Specialization index 2001(Residence)
	Land price index	X12	Land price index 2001(thausands ¥/sqm)
		X13	The rate of change of the land price index for five years(%)
	Accessibilities	X14	Dummy variable(Meieki)
		X15	Dummy variable(Sakae)

Dummy variable: "1" Meieki(or Sakae) and adjoining town area(is A), "1/2" The town which adjoins A(is B), "1/3" The town which adjoins B.

Table 1: Variable list for factor analyses.

Next, focus is given to the patterns of land prices in 2006. Sakae 3-chome had the highest land price with 1,401, followed by Meieki 1-chome with 1,349. These results are the reverse of the street value indexes, and this is because the high land price streets in the Meieki zone is distributed along a few specific street lines, and the pattern in the Sakae zone is broader with a grid shape. Concerning the increase ratio, however, Sakae 3-chome recorded 13.6%, and Meieki 1-chome showed a substantial increase with 23.8%. Moreover, Nishiki 3-chome and Meieki 4-chome, each of which is adjacent to the respective precinct, showed a similar tendency. On the other hand, in other 40 precincts – nearly 80% of the whole – showed a decrease of 10% or more. The land prices of the Nayabashi and Fushimi precincts located along the Meieki-Sakae axis also decreased; bipolarization in land prices was observed.

Furthermore, the relationship between the land prices and the specialization coefficients of 2001 and 2006 were examined based on the data in Fig. 9. The graph for 2001 shows the following trends: areas with a land price exceeding 1,000 specialize in retail; areas with a price exceeding 400 up to 1,000 specialize in offices; and areas with a price of 400 or lower specialize in residential. The graph for 2006 shows similar trends; however, a threshold was seen around 800 and a growing gap was seen between those areas with increasing and decreasing land prices.

5.2 Factor Analysis by Stepwise Multiple Regression Method

Analysis was carried out to examine the factors of the floor-area ratio (FAR) in 2006 and the percentage increase/decrease from 2001 in the FAR. For analysis of the explained variables, the FAR in 2006 and its increase/decrease were prepared; and 15 candidate factor variables were prepared and classified under precinct (chome) situations, characteristics, land prices and accessibility (Table 1). Prior to analysis, a correlation matrix was found, and the following variables in 2001 were suspected of having multicollinearity and eliminated: FAR (X1), commercial FAR (X2), office FAR (X3), and residential specialization coefficient (X11). Then, by using the stepwise multiple regression method, the standard partial regression and multiple correlation coefficients were found. Table 2 shows the results obtained through analysis. For analyzing the FARs, the multiple correlation coefficients were over 0.9 or more for all, and highly persuasive factors were obtained. On the other hand, the FAR increase/decrease (Y5) and the office FAR increase/decrease (Y7) gave relatively low multiple correlation coefficient values.

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
X1								
X2								
X3								
X4	0.285			1.030				0.624
X5	0.266	0.176						
X6	0.325		0.168			0.356		
X7		0.103	−0.100					
X8					−0.492		−0.323	
X9	0.159	0.576				0.561		
X10	0.610	−0.091	0.748	0.179				0.448
X11								
X12	0.379	0.509	0.214		−0.267			
X13								
X14						−0.462		
X15		−0.068				−0.270		
Multiple correlation coefficient	0.953	0.981	0.908	0.940	0.396	0.713	0.323	0.522

Table 2: Extracted candidate variables with standardized partial regression coefficient values (by stepwise multiple regression method)

Next, the selected factor variables were considered. With regard to the 2006 FAR (Y1), the values of the office specialization coefficient (X10, 0.610), and land price (X12, 0.379) were high. Similarly, for the 2006 office FAR (Y3), the office specialization coefficient (X10, 0.748) and land price (X12, 0.214) were chosen; office specialization and land prices contributed as factors. For the 2006 retail FAR (Y2), the retail specialization coefficient (X9, 0.576) and land price (X12, 0.509) were selected, and for the retail FAR increase/decrease (Y6), retail specialization coefficient (X9, 0.561) and a accessibility variable to the Nagoya Station (X14, -0.462) were the main factors. The period between 2001 and 2006 saw a rise of the seesaw in favor of the Sakae zone, which experienced an increase in retail floor area.

For 2006 residential FAR (Y4), 2001 residential FAR (X4, 1.030), and office specialization coefficient (X10, 0.179) were selected. In the residential FAR increase/decrease (Y8) as well, the same factors were at play, and it was found that the residential specialization areas became even more specialized. In addition, residential FAR (X4) in standardized coefficient exceeded 1.0, and it can be considered that this was because of a slight multicollinearity effect. Regarding the FAR increase/decrease (Y5) and the office FAR increase/decrease (Y7), the multiple correlation coefficients had a low value of less than 0.4, resulting in a difficulty in finding any contributory factors.

	Group Ⅰ	Group Ⅱ	Group Ⅲ
Category	<0%(minus)	0%–10%	<10%
The number of the cho-mes	8	22	21

Table 3: About the classification of three groups, and the number of the precincts (cho-mes)

	Discriminant coefficient (Group Ⅰ)	Discriminant coefficient (Group Ⅱ)	Discriminant coefficient (Group Ⅲ)	Partial F value	Lamda statistics	F value
X7	−2.332	−0.400	1.307	13.106	0.374	7.153
X9	0.996	−0.066	−0.310	1.771		
X11	−0.002	0.406	−0.424	1.425		
X13	−1.725	−0.004	0.662	5.448		
constant term	−2.274	−0.137	−0.712			

Table 4: The factor of the FAR(Office) change by discriminal coefficient

5.3 Factor Analysis of the Office FAR Increase/Decrease by Employing Discrimination Analysis

In the foregoing section there were two variables for which it was not possible to gain a clear understanding, and one of them, the office FAR increase/decrease (Y7), was selected for discrimination analysis. Firstly the office FAR increase/decrease (Y7) was classified into three ranges: less than 0% (Group I); 0% to less than 10% (Group II); and 10% or more (Group III) as shown in Table 3. These three groups were defined as group variables, and by using the same candidate factor variables, linear discrimination analysis was carried out for the three groups. As a result, with the four variables listed in Table 4, a good discriminant was obtained with the F value of 7.153, and an accuracy rate of 68.6%.

When the standardized discriminal coefficients were examined, the following was found: in the areas with a decrease, 2001 industrial FAR (X7) and the land price increase/decrease (X13) acted as strong negative factors; in the areas with a less than 10% increase, residential specialization coefficient (X11) acted as a strong positive factor; and in the areas with a 10% or more increase, 2001 industrial FAR (X7) and the land price increase/decrease (X13) acted as strong positive factors. It can be interpreted that this is because the shift from industrial use to offices caused a rise in land prices.

6 CONCLUSION

The results of this research are summarized below:

From 2001 to 2006, in each precinct of the Nagoya CBD, an increase of floor-area ratio(FAR) in each use was seen and a variety of floor uses was developed. Floor areas of both the Meieki and Sakae blocks kept increasing equally, and in this period, no significant decline in the position of the Sakae block was seen.

From 1997 to 2007, the retail floor amounts substantially increased, but the floor efficiency value greatly decreased; this was in accord with a general trend seen throughout Japan. Meieki and Sakae as two major retail cores with department stores as the main players were no exception to this phenomena; however, in this period, the increased floor area amount was noticeable in Meieki, and the share of sales also increased to 4 : 6.

Land prices in 2006, when compared to 2001, showed a broadening gap in the whole CBD with high prices and low prices. In relationship to each floor use, the specialization threshold was high led by retail specialization, and followed by office and residential specialization. Land prices were still high in Sakae, but Meieki had overtaken its rival to win the competition for the highest land price.

With regard to the 2006 floor-area ratio (FAR) and its fluctuations, the factors were analyzed, and for each use category FAR in 2006, its use category specialization coefficients in 2001 were major contributory factors, and a tendency on specialization or aggllomeration was recognized. In addition, analysis was conducted by classifying the office FAR increase/decrease into three groups; as a result, it was found that particularly 2001 industrial FAR and land price increase/decrease played key role factors. It can be interpreted that this was because the shift from industrial use to offices caused a rise in land prices.

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