The Relationship Between Locational Characteristics And Established Organizations Of Day Care Centers For The Elderly

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Abstract

This paper aims to clarify the relationship between location characteristic and established organizations of day care centers for the elderly. In Yamaguchi Prefecture took as an object of this study, the aging is advancing, and the growth of demand for day care service is forecast to continue in the future. In the city area, many commercial companies have entered as established organization of day care centers, and the small-scale day care centers have concentrated. On the other hand, in the depopulating rural area, most of the day care centers are managed by the social welfare corporation and the nonprofit social welfare council and so on. And there is the construction example of the service network which combined the large-scale core day care centers managed by the social welfare corporation and the small-scale day care centers managed by the social welfare council. It is a view as the future construction method in the unconstructed autonomies which is seen in most of depopulating rural areas.

Keywords: Day Care Center; Location Characteristic; Established Organization; Quantification Theory Ⅲ Analysis; Cluster Analysis

1. Introduction

Social welfare system reform has been carried out from the late 1980s because welfare demand was increased with aging progress. Nursing-care insurance system is introduced in 2000, and the new supply of the day care centers aiming to support the home health care and the home visiting care support center has been advanced, and the small-scale centers with capacity less than ten users have been increasing. About the management organizations including the social welfare corporation, the entries of the commercial company increase rapidly with the nursing-care insurance system as a direct opportunity. In 2009, the commercial companies account for 40% of all (9,800 facilities) and the entries of medical corporations, NPO (non-profit organization), and so on are tending to increase. In this way, the rapid increase of new supply, the increase of small-scale facility and the diversification of the established organizations have been bringing new situation in the field of day service business. At the present time when ten years have passed since nursing-care insurance system was introduced, it is current issues to grasp the supply characteristics of day-service centers and to marshal the results and the problems of the establishment of the facilities.

In previous studies of the field of building and city planning, there are the studies grasping of the location actual, the evaluating of the service level, the considering and suggesting of

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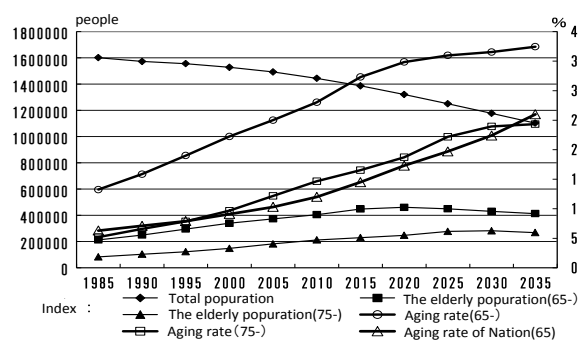e-mail: t011vm@yamaguchi-u.ac.jp

Fig.1. Change of population and Aging Rate of Yamaguchi

optimal location layout planning [1-4], and clarifying the characteristics of the demand for the elderly [5]. On the other hand, about the problems concerning disparities of welfare services, there are the accumulation of the study such as the research pointing out uneven distribution and regional disparity of the facilities location for particular areas [6-7]. But, there are few studies analyzing time series change of the facilities supply based on each area for ten years since nursing-care insurance system was introduced and analyzing for the whole area of the local prefecture including the city area and the rural area where the depopulation and the aging are remarkable.

This paper takes Yamaguchi prefecture as an object, where the aging is progressing rapidly at the nationwide level and it is estimated to increase the demand of the facilities from now on. And this paper aims at grasping the supply characteristics in each area from the analysis of the established process of the facilities and clarifying the assignment for the facilities supply in the future.
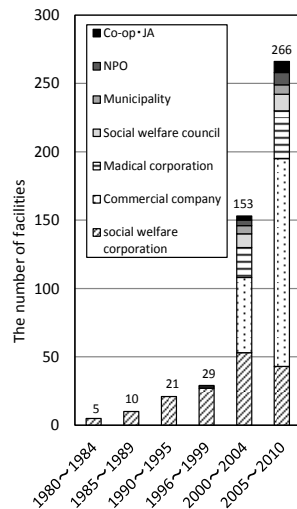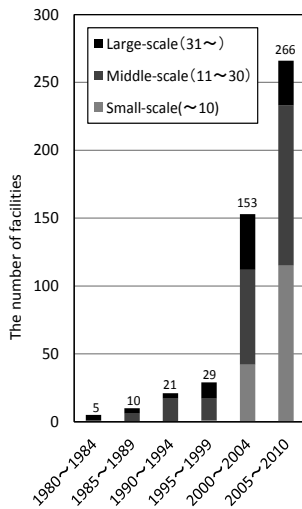
Fig.2. Change of New Supply
of Day Care Centers
(Scale of User Capacity)

Fig.3. Change of New Supply
of Day Care Centers
(Established Organization)

Fig.4. Plot Map of Institution Supply Trend (-1999/-2010)

2. Target Ground and Analysis Data

It is estimated that the population of Yamaguchi Prefecture that is the object of this study will decrease to 1,100,000 from 1,600,000 between 1985 and 2035 (Fig.1). On the other hand, the population over 65 years old will have doubled to 460,000 from 210,000 between 1985 and 2020 and will have decreased gradually after that. And the aging rate will have reached 37% with the decrease of total population in 2035. Moreover, it is estimated that the population over 75 years old will increase more than three times to 277,000 from 83,000 between 1985 and 2025, and the welfare service demand for the elderly will increase more for the next 10-15 years. From these guesses, Yamaguchi Prefecture is taken as the object of this study.

In this study, we constructed the database regarding day care centers in Yamaguchi Prefecture from 1980 when the first day care center was established to 2010. And we constructed the database regarding elderly population with the analysis unit of the district of municipality at 2000. We analyzed the relationship between location characteristics and established organizations of day care centers for the elderly with these databases.

The data used for analysis is compiled from WEB site: Insurance Information Service Guide of Yamaguchi Prefecture / Database of Service Establishment / Day Care (Elderly Citizens' Welfare Division in Yamaguchi Prefecture), Result of National Census (1985-2010), National Institute of Population and Social Security Research : Future Population Estimates(2010-2035).

3. Location Trend of Day Care Centers
3.1 Change of the Number of the Facilities

The change of the number of new supply of day care centers in Yamaguchi Prefecture is shown in Fig.2, 3.The yearly supply of the facilities was 16.8 facilities/year before 1999 and the total was 65 facilities at the end of 1999. But after nursing-care insurance system was introduced (2000), the supply suddenly increase and 153 facilities were supplied newly to 2004 from 2000. Moreover, after nursing-care insurance system was revised (2006), 266 facilities were supplied newly to 2010 from 2005, and the total have reached 484 facilities at the end of 2010.
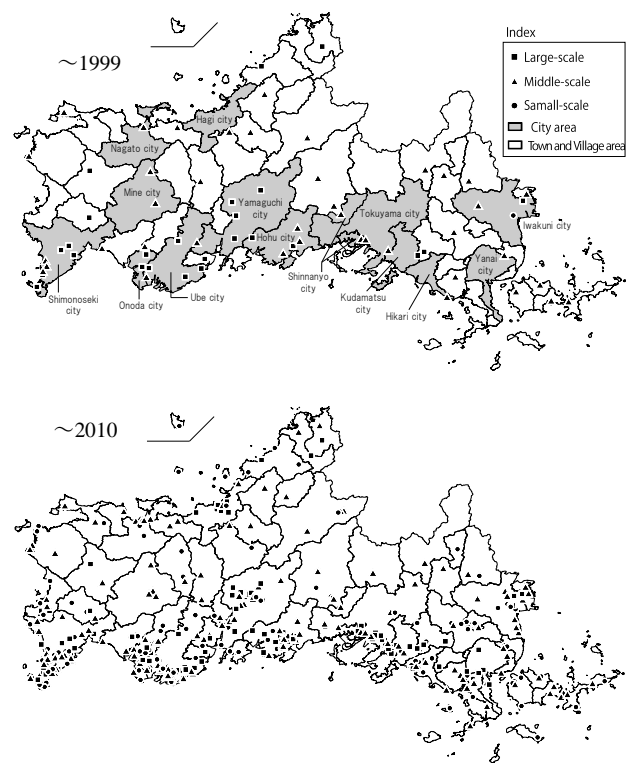
From viewpoint of the scale of user capacity (Fig.2), the middle-scale facilities which have the capacity of 11-30 users account for the most of all facilities, and in addition to that, the supply of the large-scale facilities which have the capacity of more than 31 users and the small-scale facilities which have the capacity of 10 users or less increased to 2004 from 2000. After 2005, small-scale facilities largely increased and accounted for 43% of new supply, because at-home nursing-care service was recommended and the community-based small-scale facilities increased by nursing-care insurance law revision in 2006.

From viewpoint of the established organization (Fig.3), social welfare corporations accounted for most of all organizations before 1999 (63/65 facilities), and the entries of commercial companies (55 facilities) and medical corporations (22 facilities) and other new organizations increased to 2004 from 2000. Comparing 2005-2010 and 2000-2004, the new supply of commercial companies have reached 152 facilities which is about 3 times, and the component ratio of established organizations is commercial company (43%) : social welfare corporation (33%) : medical corporation (12%) : social welfare council (5%) : municipality (3%) : NPO (3%) : co-op or agricultural co-op [JA] (2%).

3.2 Change of the Facilities Distribution

Fig.4 shows change of the facilities distribution before 1999 and at 2010. Before 1999, middle-scale facilities and large-scale facilities which managed by social welfare corporation accounted for most of all, and these facilities were dispersed throughout Yamaguchi Prefecture. Approximately 70% (46/65facilities) of these functions as the local welfare base for elderly over 65 years old called "special nursing home", which also managed by social welfare corporation and aim for support of long-term care service.

Table 1. Category Score by the Quantification Theory Ⅲ Analysis

	Category	I axis	II axis	III axis
Established organization	Social welfare corporation	1.73	−0.74	−0.36
	Commercial company	−1.11	−0.72	−1.16
	Medical corporation	−0.14	4.93	−0.32
	Others	−0.61	−0.38	4.28
Capacity of user	～10	−0.38	−0.21	−0.35
	11～	1.35	0.75	1.26
Building form	Newly-built facility	−1.39	−0.87	0.88
	Annexed or repaired facility	0.48	0.30	−0.30
Time of establishment	～1999	2.84	−1.23	−0.01
	2000～	−0.45	0.20	0.00
Accumulation contribution ratio		29.32%	46.73%	63.81%

Table 2. Result of Facility Characteristic Classification

Group		1	2	3	4	5	6	7
I average		1.58	0.78	0.29	0.20	−0.10	−0.54	−0.08
II average		−0.25	0.13	−0.16	1.44	0.03	−0.22	0.00
III average		0.61	0.60	0.09	0.67	0.23	−1.37	5.08
Established organization (%)	Social welfare corporation	100	100	100	–	–	–	–
	Commercial company	–	–	–	–	100	100	–
	Medical corporation	–	–	–	100	–	–	–
	Others	–	–	–	–	–	–	100
Capacity of user (%)	～10	–	–	64	13	–	100	36
	11～	100	100	36	87	100	–	64
Building form (%)	Newly-built facility	4	–	44	20	36	38	36
	Annexed or repaired facility	96	100	56	80	64	62	64
Time of establishment (%)	～1999	100	–	–	5	–	–	6
	2000～	–	100	100	95	100	100	94
Number of cases		56	67	25	55	94	93	67

After 2000, the facilities have been established intensively at the south coast because these areas have relatively big population scale and elderly population scale among this prefecture. It is also the characteristic of these city areas that small-scale facilities increase suddenly. And it is the factors of effective in the over-concentration of the facilities that the demand of the day care service will increase with population aging and the pick-up time can be reduced from having high elderly population density [8].

4. Facility Characteristic Classification

In this chapter, we classified the facilities into 7 types to arrange the characteristics of day care centers in 2 following ways.

First, we carried out the quantification theory Ⅲ analysis with 4 indexes that management organization, user capacity of the facility, building form and established time. Table 1 indicate the category score calculated by that analysis.

Ⅰ axis shows the positive value in established organization (social welfare corporation), user capacity (11 or over users), established time (before 1999) and the negative value in building form (newly-built facility), established organization (commercial company), established time (after 2000). This is interpreted as the axis showing the facility established by social welfare corporation before 1999 and commercial company after 2000.

Ⅱ axis shows the positive value in established organization (medical corporation), user capacity (11 or over users), building form (annexed or repaired facility), established time (after 2000) and the negative value in the others. This is interpreted as the axis showing the facility established by medical corporations.

Ⅲ axis shows the positive value in established organization (social welfare council, NPO, municipality, co-op and JA), user capacity (11 or over users), building form (newly-built facility). This is interpreted as the axis showing the facility established by the organizations which have entered newly after 2000.

Next, the facility characteristic was classified into seven groups by the cluster analysis that made the scores from Ⅰ to Ⅲ axis. Table 2 indicate the result of the cluster analysis. The established organization of G1 and G2 and G3 is social welfare corporation, and G1 (56 institutions) is the exceeding middle-scale facilities established before 1999 and most the facilities of the group are annexed or repaired (96%). G2 (67 institutions) is the exceeding middle-scale facilities established after 2000 and all the facilities were annexed or repaired. G3 (25 institutions) is mostly the small-scale facilities (64%) and all the facilities were established after 2000. All of G4 (55 facilities) was established by medical corporation and it is the exceeding middle-scale facilities

established with repair or annex after 2000. G5 and G6 are established by commercial company after 2000 and these types have more numbers of the facilities than the other types. G5 (94 facilities) is the exceeding middle-scale facilities, and G6 (93 facilities) is the small-scale facilities. G7 (67 facilities) is established by social welfare council, NPO, municipality, co-op and JA, and most of the type were established after 2000.

5. Municipalities Classification with Facility Characteristic
5.1 Municipalities Classification by the Cluster Analysis

In this chapter, we classified municipalities to grasp the location pattern of the facilities and the regional characteristics.

First, the municipalities were classified into the following 3 types. Type L・L is the municipalities where located the facilities before 1999 and after 2000. Type U・L is the municipalities where un-located the facilities before 1999 and located after 2000. Type L・U is the municipalities where located the facilities before 1999 and un-located after 2000.

Next, Type L・L (35 municipalities) was classified into 5 types by the cluster analysis with 4 indexes (composition ratio of established organizations (%), established rate (%), increase the number of facilities / area (facilities/ha), capacity density (user capacity / 1000 elderly persons)). Type U・L (15 municipalities) was classified into 3 types in the same way. The result and index average of each classification calculated by the cluster analysis is shown in Table.3.

In type A (9 municipalities), the rate of the facilities established by medical corporations is 26.6% and the rate of the small-scale facilities established by commercial companies is 23.3%. Moreover, increase the number of facilities / area indicates highest numerical value (18.9 facilities/ha), and capacity density increases drastically from 18.4 to 56.9 between 2000 and 2010.

In type B (9 municipalities), the rate of the exceeding middle-scale facilities established by commercial companies occupy 43.1% and capacity density increase from 14.6 to 56.5 between 2000 and 2010.

In type C (7 municipalities), the rate of the small-scale facilities established by commercial company occupy 44.1%, but increase the number of facilities / area (4.1 facilities/ha) and capacity density at 2010 (43.7) and established rate (60%) indicate relatively low numerical value.

In type D (7 municipalities), the rate of the facilities established by social welfare corporation before 1999 occupy 48.3% and the rate of the facilities established by social welfare council or

Table 3. The Result and Index Average of Municipality Classification

Location or Un-location	Type code	Type name	Number of case	Composition ratio of established organizations (%)							Established rate (%) (2010)	Increase the number of facilities / area (person/ha)	Capacity density /1000 (2000)	Capacity density /1000 (2010)	Tree diagram
				G1	G2	G3	G4	G5	G6	G7					
L·L (35)	A	Medical + Company (S)	9	13.2	11.4	3.6	26.6	14.9	23.3	7.2	85.5	18.9	18.4	56.9	
	B	Company (M·L)	9	17.4	5.7	4.1	5.8	43.1	13.3	10.7	62.4	7.8	14.6	56.5	
	C	Company (S)	7	22.0	2.9	2.4	2.0	6.8	44.1	19.8	60	4.1	22.2	43.7	
	D	Welfare(−1999) + Others	5	48.3	0	0	0	5.0	0	46.7	68.3	3.1	27.2	39.2	
	E	Welfare(−1999) + (2000−)	5	45	20	25	0	0	0	10	100	1.5	44.4	61.6	
U·L (15)	F	Others	5	0	2.1	6.3	6.3	3.6	9.8	72.0	100	12.1	0	49.1	
	G	Welfare (M·L)	6	0	39.8	14.2	4.0	15.7	15.1	11.2	80	11.1	0	45.5	
	H	Only Welfare(2000−)	4	0	100	0	0	0	0	0	83.3	5.2	0	25.9	
L·U(6)	I	Only Welfare(−1999)	6	100	0	0	0	0	0	0	72.2	—	42.0	30.5	

Note : (S) shows the small-scale facility, and (M·L) shows the middle-scale and large-scale facility.
Medical shows medical corporation, and Company shows commercial company, and Welfare shows socia welfare corporation.

Table 4. Relationship between Municipality Classification and Population data

| Location or Un-location	Type code	Type name	Number of case	2000				2010				2000-2010		area (ha)
				population	elderly population	elderly population density (persons/ha)	Rate of aging (%)	population	elderly population	elderly population density (persons/ha)	Rate of aging (%)	Rate of population fluctuation (%)	Rate of elderly population fluctuation (%)	
L·L (35)	A	Medical + Company (S)	9	88812	7612	48.9	9.8	85436	11258	72.3	14.8	−5.2	44.5	155.7
	B	Company (M·L)	9	38077	3563	24.4	12.7	36675	5006	34.3	18.5	−8.9	33.5	145.9
	C	Company (S)	7	11805	1577	12.3	14.0	10397	2133	16.7	21.9	−12.9	36.6	128.0
	D	Welfare(−1999) + Others	5	11507	1446	12.8	15.9	10643	1854	16.4	22.0	−11.9	24.4	112.8
	E	Welfare(−1999) + (2000−)	5	4132	636	6.6	15.9	3505	841	8.7	24.8	−16.1	30.9	96.4
U·L (15)	F	Others	5	17475	2081	36.5	15.0	15711	2854	48.4	18.2	−11.7	32.2	59.0
	G	Welfare (M·L)	6	18810	1917	32.6	10.6	18094	2762	48.5	15.3	−5.2	45.3	73.8
	H	Only Welfare(2000−)	4	4371	650	22.4	15.8	3872	867	28.7	22.4	−12.8	32.6	61.0
L·U(6)	I	Only Welfare(−1999)	6	5769	655	20.2	11.3	5319	901	28.9	21.8	−13.4	34.7	77.0
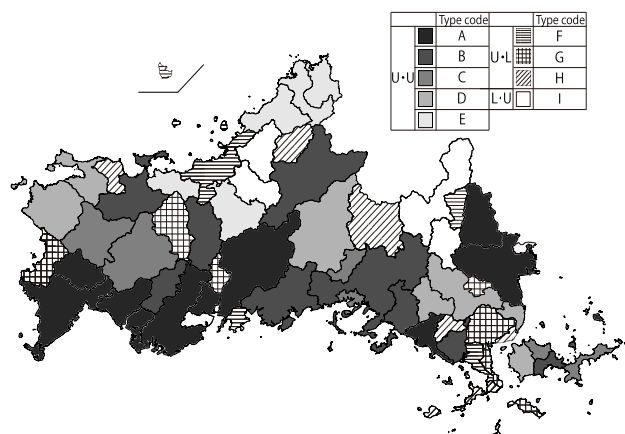
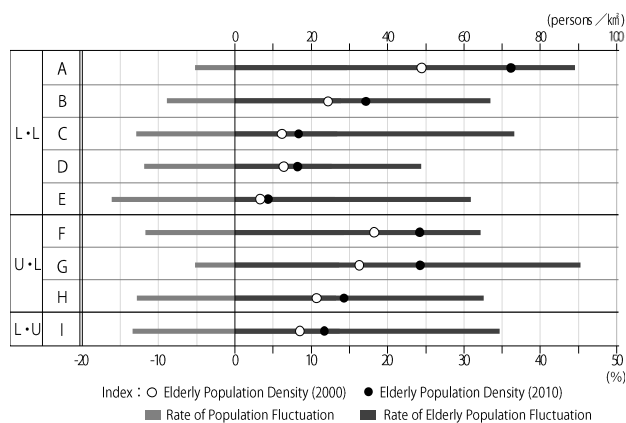Fig. 5. Distribution of Municipality Classification

Fig. 6. Population Density and Rate of population fluctuation

each municipality or so on after 2000 occupy 46.7%, but capacity density at 2010 indicates low numerical value because increase the number of facilities don't increase so.

In type E (5 municipalities), increase the number of facilities / area indicates the lowest numerical value among all types and the facilities establishment was not much advanced after 2000. This is because capacity density at 2000 is already high (44.4%) by establishment by social welfare corporation before 1999. Moreover, in this type, the results that capacity density at 2010 indicates the highest numerical value among all classifications and the service level is high were clarified.

Next, type F, G, H is the municipalities which did not established the facilities before 1999.

In type F (5 municipalities), there are many entries by the other corporations such as social welfare council or each municipality after 2000, and in type G (6 municipalities), there are many

exceeding middle-scale facilities established by social welfare corporation after 2000. And in the both types, capacity density drastically increases.

In type H (4 municipalities), there is only exceeding middle-scale facilities established by social welfare corporation after 2000. And capacity density at 2010 indicates the lowest numerical value (25.9) among all classifications, and the establishment level is the lowest because increase the number of facilities / area indicates low numerical value (5.2 facilities/ha).

Finally, in type I (6 municipalities), there is only facilities established by social welfare corporation before 1999 and there is not entry of established organizations after 2000, and capacity density decrease from 42.0 to 30.5 among 2000 and 2010 by increasing of the elderly population.

5.2 The Characteristic of Municipality Classification
The relationship between municipality classification and

elderly population is shown in table 4 and the distribution of the municipality classification is shown in Fig. 5.

Type A that increase the number of facilities / area indicates the highest numerical value is located a lot in the city area, where have the large population scale and located nearby coast. And in the city area, there are the many facilities established by medical corporation annexed hospital because there are much more hospitals than rural area. Type B is also located a lot in the city area, but the elderly population scale is not so large compared to type A. In type C and D, increase the number of facilities / area is relatively low, and the elderly population is relatively larger than other rural areas because these municipalities have large areas. On the other hand, Type F, G are the municipalities that elderly population density is high because the areas are small and have large elderly population. Type E, H, I are located a lot in the depopulated rural areas where the population scale is small.

Next, the indexes which are significant results gained from table.4 is indicated in Fig.6. The indexes are elderly population density at 2000 and 2010 and rate of elderly population fluctuation from 2000 to 2010.

In type A, many new entries of commercial company is increasing because the elderly population scale is large and the demand of day care centers is expected to increase. And the points which elderly population density is high and it can reduce pickup cost and time are regarded as factors promoting the concentric location of the facilities. In type B, G which elderly population scale and elderly population density scale is middle, the supply of middle-scale facilities occupy most and there is few supply of small-scale facilities. Next, in type C, D, E, H, I, it is thought that establishing facilities have not been provided so much from the view point of pickup cost and time because the condition of small-scale elderly population density. About Type D, E, H, I in particular, it suggests severe management profitability conditions in depopulated rural area such as the rate of social welfare corporations is high and the rate of commercial company is low.

6. Conclusions

In this paper, the relationship between location characteristic and established organizations was examined from the facility characteristic classification and municipality classification. The result are as follows.

(1) The yearly supply of day care centers for the elderly was 2-6 facilities before the introduction of nursing-care insurance system in 2000, but it increased to around 30-40 facilities after that. And the community-based small-scale facilities increase rapidly and occupied 43% of new supply after nursing-care insurance law revision that promotes the establishment of the small-scale facility in 2006.

(2) In the city area, the elderly population scale is large and the rate of elderly population fluctuation is high. These affect for the factor which promoting concentric location of the facilities managed by commercial company aiming at profit, and this tendency is expected to continue into the future because it is expected that the demand of day care center will increase. On the other hand, in the rural area that population scale is small and population density is low, it is thought that establishing the facilities is not provided because it can't be expected the demand

of day care centers will increase drastically and the pick-up efficiency is low. And in nearly depopulated rural area, new supply of the facilities managed by commercial company is not provided, and the supply of the facilities managed by social welfare corporation or social welfare council not for profit is provided.

Accordingly, in the rural area where established only the exceeding middle-scale facilities, constructing the service network [9]   (The service network that combine the central facility with advanced function which established by social welfare corporation or medical corporation and the distributed arrangement of small-scale day care center with multiple functions which leased and repaired the existing facilities that the site acquisition and construction cost are unnecessary.) promotes improvement of the service level and the pick-up efficiency, and it is expect as the effective method to secure stability and profitability of the facilities management.

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