Strategy and Management Behavior of Medical Malls: Focusing on Competition over Location and Clinical Departments

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Abstract

Clinics across Japan are competing for location and clinical department. As an example of this phenomenon, medical malls have recently been developed throughout Japan. In this study, we conducted a comprehensive survey of medical malls in Japan, focusing on location and competition in clinical departments, and then analyzed their strategies and management behavior. First, we identified 2,501 medical malls, 9,539 clinics, and 1,869 pharmacies. Of the medical malls, 80% were located in Tokyo, Kanagawa, Osaka, Hyogo, Chiba, Hokkaido, and Saitama Prefectures. Second, multiple regression analysis was conducted to examine whether the medical malls' location choice was based on strategic behavior. Population density had an affected but not related to hospital location. Third, we analyzed the growth rate of 33 clinical departments from 2008 to 2019 in order to clarify the increasing effect of medical mall clinical departments. As a result, 28 clinical departments including gastroenterology, allergy, pediatric dentistry, rehabilitation, orthodontics, etc. increased remarkably. In light of the above, it can be said that medical malls are strategically clustered in urban areas with high population density and good access to transportation and living. In addition, these specialists may differentiate themselves from those in existing clinics by operating within a medical mall. These findings point to the existence of inter-clinic competition.

Key words

Medical Mall, Clusters of Clinics, Strategy and Management Behavior, Competition over Location and Clinical Department, Complete Survey

(1) Introduction

1. Identification of the problem

In recent years, amid the globalization of the economy and advancement of countries toward an information society, geographical advantage in economic activities has become less important than in the past. However, the phenomenon known as "clusters," in which firms are concentrated in specific regions, has been pointed out in the field of management studies as a paradox to this trend. These issues are an important theme in the study of competitive strategy, regardless of industry (Porter, 1998).

Clusters are geographic concentrations of interconnected firms and institutions in a particular field (Porter, 1998). In Japan, clusters specializing in specific industries have been

identified throughout the country (Yamawaki, 2002). In particular, they are said to contribute significantly to the competitiveness of Japanese firms and to economic development (Jankowiak, 2011). Meanwhile, to ensure equitable access to health care in Japan, the government has set a policy of uniformity in the supply of health care by defining medical areas based on the medical plans of each prefecture. Therefore, the number of hospitals and doctors per population is, to an extent, evenly distributed as far as the county level is concerned. In addition, recent advances in ICT have improved access to health care, making location less advantageous than in the past.

Furthermore, Health care is known as an industry where the principle of competition does not work and the market mechanism does not function effectively (Akerlof, 1970). As such, health care clusters are unlikely to be formed. However, does this premise apply to medical care clinics in Japan? In principle, the domestic medical market is regulated under the public medical insurance system, which does not allow price competition. Given that the number of hospitals and beds is regulated in the regional medical care plans of each prefecture, there is little freedom in management compared with ordinary companies (Matsuda, 2019).

However, the market environment for clinics is vastly different. For example, since most clinics have no beds, the initial cost to open them is low compared with hospitals with a hospitalization function, and the barriers to entry are likewise low. Therefore, doctors can freely open clinics in any region, and except for anesthesiologists, they can profess to be the majority of clinics.

In recent years, the number of clinics nationwide, including dental, has reached 170,000 (Ministry of Health, Labour and Welfare, 2014). In other words, the clinic market is saturated, with clinics having to compete for location and departments (Yoshida and Kohno, 2007). One example of this phenomenon is the medical mall, which is a cluster of clinics strategically formed to give specialists a competitive advantage. In Japan, SL Medical Group was established in Nagoya City, Aichi Prefecture, in 1972. However, if there is no competition, then how can the formation of these clusters of clinics be explained? The answer to this question is not self-evident and is therefore open to debate.

A medical mall is not a medical facility as defined by the Medical Care Act; rather, it is generally an establishment where multiple clinics and pharmacies are concentrated in a specific space (Ito, 2020). Health care management in Japan is generally inefficient, and labor productivity is low, because management is strongly regulated to ensure quality, reliability, and safety. In particular, clinics are significantly less efficient and productive than hospitals because they are primarily run by a single doctor. Moreover, medical practitioners are not trained in management, and their knowledge in this area tends to be poor. However, medical malls often involve multiple clinics and pharmacies, plus a consulting organization that provides management support for handling issues in public relations, finance, accounting, organization, and facilities. Medical mall practitioners receive management support from this organization, which allows for division of function and collaboration, thus improving the quality and efficiency of clinics. As the quality of health care improves, costs can be controlled (Porter and Teisberg, 2006). Therefore, medical

malls may be superior to existing clinics in terms of management.

Medical malls are advantageous to physicians, such as enabling the provision of high-quality medical care in a comprehensive manner and the sharing of expensive testing equipment by establishing a network system in which multiple physicians work together to practice group medical care. This is expected to improve ability to attract customers and profitability (Ito, 2014; Lin and Chen et al., 2006).

Meanwhile, users benefit from the plurality of clinical departments with high specialization, as in the outpatient department of a hospital. Therefore, users can access more highly specialized medical care more efficiently compared with other clinics (Bobbitt; 2011, Ito, 2016a)[1]. Thus, if medical malls benefit both doctors and users through inter-clinic competition, there is some economic rationality to their operation (Hill and Hack, 1985). However, only 28.9% of medical malls are linked to one another, so the case may be that multiple clinics happen to be gathered in a specific space by chance (Ito, 2016b). To confirm the existence of competition among clinics, we sought to examine the strategy and management behavior of medical malls in terms of location and clinical departments.

2. Study objectives

Despite the accumulation of cluster research, the explanation and discourse are lacking regarding the actors and roles that have supported the development of clusters (Motoyama, 2008). In particular, medical malls have emerged as clusters of clinics in the health care sector, but the role they play remains unclear. Clinics may form clusters as a strategic intention to gain advantages in the sector's competitive market environment. This is the research question of our present study.

Comprehensive discussion of inter-clinic competition is scarce. We assumed that if competition is working, the medical mall should act on a different strategy from existing clinics. For example, multiple specialists working together to practice group medical care have advantages that cannot be obtained through individual practice, such as a reduced burden on doctors and improved quality of medical care. Therefore, doctors operating their own clinics may consider forming a cluster (Zwiep et al., 2018). Meanwhile, if there is no competition, the behavior of the medical mall is the same as that of existing medical clinics; that is, the medical mall is merely a specific space that happened to have multiple clinics. In other words, the existence of competition is reflected in the location and clinical departments of the medical mall. Therefore, the purpose of our research was to clarify the strategies and management behavior unique to medical malls, paying attention to the location and clinical departments of distribution.

Regarding the actual number of medical malls in Japan, no official government statistics have been prepared. A survey by the Japan Institute of Management showed that 1,500

[1] Problems with medical malls have also been pointed out. One is that cooperation among doctors is difficult because of the large number clinics that are independent from management, which means that transaction costs are incurred. Another is that malls are located in areas with high land prices, leading to high rental costs and the risk of increasing management burden unless a certain level of profit can be expected.

medical clinics were open in 2005, using four clinics as the unit of calculation, it's estimate gave 375 locations (JMA Research Institute Inc., 2012). A later survey showed 418 locations (Ito, 2010). A survey conducted by Yano Research Institute in 2012 calculated two or more clinics into medical malls and found 925 locations. However, these surveys do not necessarily capture the population. As such, basic information on the national medical mall is necessary to shed light on the strategy and management behavior of the medical mall. Therefore, we attempted to uncover the medical mall by conducting a complete survey.

(2) Method

1. Survey method

The definition of group practice, which is commonly adopted in primary care in Western countries, was used as a reference, given the necessity to establish evaluation criteria for investigating medical malls. Group practice has been defined as follows:

Group practices were defined as being a medical practice with any specialisation where at least three physicians work together in a team (Josi and Pietro, 2019, p. 1).

Therefore, we defined the medical mall as a "location where three or more clinics, including dentists, are located in the same space." In the United States, as of 2011, group medical care consists of more than 50 doctors, accounting for 35.6% of the total (Welch et al., 2013; Wald et al., 2018). In Japan, however, clinics are operated mainly by one doctor, and the minimum number of doctors in a medical mall is three.

If medical malls are viewed as the medical version of shopping malls, then it is desirable to narrow the area of analysis, as competition for shopping malls is inherently occurring in a limited area. However, it is not clear whether the clustering of clinics is occurring in a specific area or is a phenomenon that is occurring across Japan. This must be considered because medical regions are, in principle, constrained by medical planning and, with the exception of Hokkaido and Nagano Prefectures, are defined based on prefectures. Further, since we collected statistics covering the number of medical malls in the country, we attempted to compare the number of medical malls by prefecture as a pilot study.

Next, using the database of medical facilities (WBS) [2] compiled by the Wellness Medical Information Center in November 2019, we confirmed the address, specifically the longitude and latitude, of the clinics and pharmacies in the same space. By doing so, we developed a directory for medical malls.

2. Analytical method

As mentioned earlier, clinics are more vulnerable to management than hospitals, but two strategies may give them an edge in this competitive environment, as shown in Table 1.

The first is the cluster strategy. The formation of these clusters is believed to increase productivity, access, and motivation, reduce transaction costs, and promote innovation (Porter, 1998). In the health care market, the larger the economy and the denser the population, the more intense the competition. For physicians to have a competitive advantage, they must provide patients with opportunities for efficient access.

[2] We have been provided with wellness data base by WELLNESS.Co., Ltd.

Table 1 Competitive relationship between existing clinics and medical malls over location and clinical departments

Existence of competition	Medical facility	Location	Clinical department	Strategy
No	Clinic	・Proportional to population density but somewhat evenly distributed ・Located near hospitals	・Advocating internal medicine, pediatrics, surgery, etc. ・Clinical department is the same between the clinics and medical malls	・Adaptation to medical policy
	Medical mall			
Yes	Clinic	・Proportional to the population density + Equal distribution ・Located near hospitals	・Advocating internal medicine, pediatrics, surgery, etc.	・Adaptation to medical policy ・Comprehensive medical care strategy
	Medical mall	・Urban areas located in the economic zone ・Located in a good space with access to traffic and living spaces	・Advocating specialized clinical departments ・Establishment centered on specialists	・Cluster strategy ・Differentiation strategy

Source: Compiled by author.

Therefore, it is reasonable for clinics to cluster strategically in the most convenient places for transportation and living spaces.

Indeed, if medical malls are acting strategically, they will be more biased of the location compared with existing clinics because they are located where patients prefer. Therefore, the existence of the cluster strategy can be verified by comparing the number of clinics, stations, and shopping centers, as well as population density and other related indicators in each prefecture with the number of medical malls (MM) . However, because MM are not facilities defined by the Medical Care Act, and the permission to open a MM differs greatly depending on the prefecture, the presence of medical-related companies, such as medical management consultants (MC), pharmacies (Ph), and drug stores (DS), which have expertise in opening of MM, may influence the establishment of MM. Therefore, these factors were also considered.

The second strategy is differentiation. One of the benefits that can be gained from clusters is specialization. When organizations within a cluster exhibit specialization and complement one another, they can maintain a competitive advantage as a whole (Yamawaki, 2002). Typically, Japanese medical practitioners have a wide range of medical abilities and careers as primary care physicians while practicing on-site in the front line, after working as hospital specialists. In recent years, to adapt to the policy trend in medical care, doctors have sought to strengthen the family doctor function and improve home medical care in support of discharged patients at hospitals. Consequently, the range of medical treatment offered is wide, and clinic management needs to be stable. Therefore, existing clinics tend to be located around hospitals, although they are evenly distributed in each prefecture (Yoshida and Kohno, 2007).

Meanwhile, securing a stable number of patients is difficult because the scope of medical care becomes narrower as specialists provide highly specialized medical care at clinics. However, given that medical malls are located

Table 2 Variables used

Variable	Abbreviation
Medical malls	MM
Clinics	C
Hospitals	H
Pharmacies	Ph
Drugstores	DS
Percentage of population aged over 65 years	P65
Population density	PD
Medical management consultant	MC
Station × shopping center	StSC
Percentage of clinical departments	Y_p
Growth rate of clinical departments	Y_d
Medical mall dummy	MD
2019 dummy	D19
DM × D19	DMD19

Source: Compiled by author.

in urban areas, particularly in areas with convenient transportation and residence, they are preferred by patients who need regular outpatient care (Pines and Mehrotra et al, 2013). Therefore, it is possible that a specialist could open a practice in a medical mall to attract more customers and differentiate itself from existing clinics. To confirm this fact, we needed to clarify the increase in number of clinical departments in the MM. In this study, the tendency that a specific clinical department is increasing in number in the MM was called the increase effect.

To test these hypotheses, we used the variables that could explain the competitive environment surrounding number of MM, as shown in Table 2. In addition, the following three analyses were performed. First, we calculated the descriptive statistics after compiling data for each prefecture regarding the number of hospitals (H), number of clinics (C), including dental clinics, Ph, and DS, population density (PD), ratio of the population aged 65 years or older (P65), and intersection of the number of stations and number of shopping centers (StSC)[3]. An ABC analysis was also conducted to clarify the regional distribution of MM, C, and H.

Second, the model with MM as objective variables and C, PD, StSC, and MC as independent variables was set as 1). Multiple regression analysis was attempted by setting the model in which the objective variable was C and the independent variables were H, P65, PD, and MC as 2). Note that α is a constant term, and u is an error term.

$$MM = \alpha + \beta_1 C + \beta_2 PD + \beta_3 MC + \beta_4 StSC + u \quad 1)$$

$$C = \alpha + \beta_1 H + \beta_2 P65 + \beta_3 PD + \beta_4 MC + u \quad 2)$$

The medical facility data used this time were adjusted for the population of 100,000 to account for the large errors among prefectures. The correlation between the explanatory variables was confirmed beforehand, and variables with a positive correlation were selected. Moreover, if an endogenous problem was suspected, the instrumental variable

[3] The number of hospitals and clinics (including dentistry) was collected from the Ministry of Health, Labour and Welfare's "Medical Facility Survey (2016)"; the number of pharmacies was collected from the Ministry of Health, Labour and Welfare's "Overview of Fiscal 2018 Health Administration Report"; the ratio of the population aged 65 years to the total population and the population density were collected from "2015 Census" of the Statistics Bureau, Ministry of Internal Affairs and Communications; the number of stations was collected from "Ranking of prefectures with many stations in Japan"; the number of shopping malls was collected from Japan Shopping Center Association's "List of shopping centers by prefecture and municipality"; and the list of medical management consultants was collected from Japan Medical Management Consultants Association's "List of approved registered medical management consultants."

Table 3 Basic information of medical malls and other variables

Prefecture	Number of medical malls	Number of offices in medical mall	Number of all clinics in medical malls	Number of pharmacies in medical malls	Number of hospitals	Number of all clinics	Number of pharmacies
Hokkaido	118	579	489	90	562	6348	2323
Aomori	6	28	21	7	96	1432	615
Iwate	2	7	6	1	93	1490	590
Miyagi	33	160	131	29	139	2731	1159
Akita	5	24	20	4	69	1254	531
Yamagata	0	0	0	0	68	1420	587
Fukushima	2	7	6	1	128	2233	874
Ibaraki	14	63	52	11	178	3115	1295
Tochigi	6	22	20	2	107	2413	892
Gunma	3	13	11	2	129	2538	903
Saitama	114	518	434	84	342	7771	2888
Chiba	134	609	494	115	286	7034	2448
Tokyo	667	2913	2450	463	651	23842	6702
Kanagawa	392	1807	1508	299	341	11700	3888
Niigata	10	39	32	7	131	2856	1142
Toyama	1	4	3	1	106	1211	456
Ishikawa	4	16	12	4	95	1353	528
Fukui	2	6	6	0	68	873	293
Yamanashi	1	4	3	1	60	1139	451
Nagano	3	11	9	2	130	2592	979
Gifu	9	31	27	4	102	2549	1032
Shizuoka	15	71	57	14	181	4494	1857
Aichi	72	345	293	52	323	9005	3368
Mie	7	27	22	5	100	2373	820
Shiga	10	48	37	11	57	1620	611
Kyoto	27	119	100	19	170	3784	1085
Osaka	339	1566	1325	241	523	13940	4170
Hyogo	219	1058	876	182	350	8044	2640
Nara	38	181	148	33	77	1897	558
Wakayama	8	29	26	3	83	1603	488
Tottori	0	0	0	0	44	760	276
Shimane	2	7	6	1	51	998	333
Okayama	11	50	41	9	164	2661	831
Hiroshima	77	378	314	64	244	4138	1615
Yamaguchi	3	11	10	1	147	1962	801
Tokushima	1	3	3	0	112	1177	390
Kagawa	8	40	32	8	90	1308	539
Ehime	0	0	0	0	141	1937	602
Kochi	4	26	22	4	130	935	391
Fukuoka	88	403	333	70	461	7749	2914
Saga	1	4	4	0	107	1112	519
Nagasaki	19	75	66	9	151	2128	738
Kumamoto	1	3	3	0	212	2305	856
Oita	4	16	13	3	157	1505	573
Miyazaki	1	4	3	1	140	1399	602
Kagoshima	4	15	12	3	252	2230	890
Okinawa	16	68	59	9	94	1511	570
Nationwide	2501	11408	9539	1869	8442	170469	59613

Note: Display the survey results of 47 prefectures. The numbers are real data.

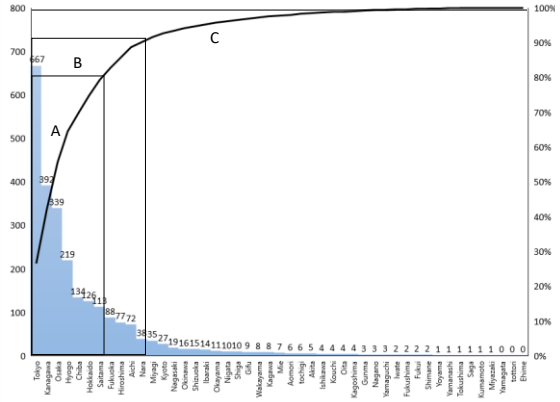

Figure 1 Pareto chart of medical malls (ABC analysis)

Note: A = Tokyo, Kanagawa, Osaka, Hyogo, Chiba, Hokkaido, and Saitama. B = A + Fukuoka, Aichi, and Hiroshima. C = Prefectures other than A and B.

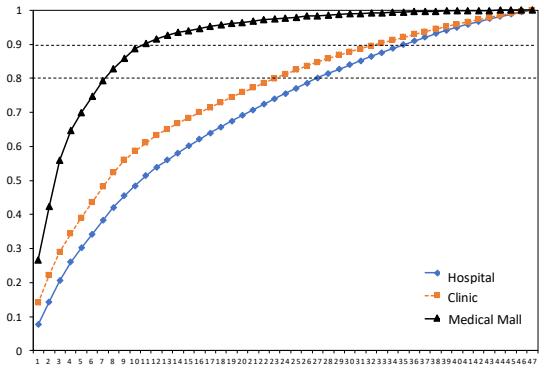

Figure 2 Pareto chart of hospitals, all clinics, and medical malls

Note 1: The cumulative frequency distribution of hospitals and all clinics has been added to the ABC analysis of the Medical Mall Criteria.

Note 2: All clinics = general clinics + dental clinics.

method (2SLS) was adopted in addition to the least squares method.

Third, we used a difference-in-differences design (DID) using regression analysis to verify the increasing effect of clinical departments in medical malls. By subtracting the growth rate of clinical departments in all clinics from that of clinical departments in medical malls from 2008 to 2019, we clarified the effect of the increasing number of clinical departments in medical malls.

In implementing DID, the following two conditions had to be satisfied. First, the trend for the number of entries in the clinic and medical mall groups had to be the same. Second, no other changes should be affecting the number of entries in the clinic and medical mall groups. Both trends were the same, and no specific events had affected the increase or decrease in the number of clinics in the country as a whole. Thus, we deemed these conditions to have been cleared.

Based on the above, the model in which the ratio of clinical departments (Y_p) could be used as the objective variable and DM, D19, and DMD19 as the independent variables was set, shown in Equation 3). We ran multiple regression analysis using an equation 4) in which the objective variable was the rate of change (Y_d) in the clinical department and the independent variable was DM.

$$Y_p = \alpha + \beta_1 DM + \beta_2 D19 + \beta_3 DMD19 + u \quad 3)$$

$$Y_d = \alpha + \beta_1 DM + u \quad 4)$$

(3) Results

1. Basic Information and Regional Distribution of Medical Malls

First, the results of the survey on the number of medical malls are shown in Table 3. We identified 2,501 medical malls in Japan, and it was found that there are 11,408 business establishments. Of these establishments, 9,539 were clinics and 1,869 were pharmacies. For an overview of the prefectural distribution, the descriptive statistics are shown in Table 4. The average number of medical malls in each

Table 4 Descriptive statistics on the number of medical institutions

	Number of medical malls	Number of offices in medical mall	Number of all clinics in medical malls	Number of pharmacies in medical malls	Number of hospitals	Number of all clinics	Number of pharmacies
n	47	47	47	47	47	47	47
Average	53.21	242.72	202.96	39.77	179.62	3627.00	1268.36
Standard deviation	123.11	552.83	463.98	88.96	139.91	4209.76	1267.12
Min	0.00	0.00	0.00	0.00	44.00	760.00	276.00
Max	667.00	2913.00	2450.00	463.00	651.00	23842.00	6702.00
Median	7.00	28.00	22.00	4.00	130.00	2230.00	820.00
Coefficient variation	2.31	2.28	2.29	2.24	0.78	1.16	1.00

Note: Display the survey results of 47 prefectures.

prefecture was 53.21, the standard deviation was 123.11, and the minimum value was 0. The maximum value was 667, in Tokyo. The average number of establishments in a medical mall was 242.72, with a standard deviation of 552.83, a maximum of 2,913, and a minimum of 0.

Second, the results of the ABC analysis of the number of medical malls by prefecture are shown in Figure 1. Of the medical malls corresponding to A, 80% were concentrated in Tokyo, Kanagawa, Osaka, Hyogo, Chiba, Hokkaido, and Saitama Prefectures. To examine the degree of bias in the location of medical malls compared with hospitals and clinics, we investigated the location distribution of three medical facilities, with the results shown in Figure 2. The Pareto chart in Figure 2 shows that the closer the distribution is to the 45-degree line, the smaller the distribution, whereas the farther the distribution is from the 45-degree line to the left, the larger the distribution. The coefficients of variation, as shown in Table 4, namely, 2.31 for medical malls, 0.78 for hospitals, and 1.16 for all clinics, suggested that the location variation of medical malls was three and two times greater than that of hospitals and clinics, respectively.

2. Factors associated with the location of medical malls

The data used this time had large errors between prefectures. Thus, we corrected the data in advance of the multiple regression analysis. Basic information adjusted to the population of 100,000 was prepared and presented in the Table 5. The descriptive statistics are shown in Table 6 and the correlation analysis is shown in Table 7. In Table 7, three variables, namely, PD, MC, and StSC, were positively correlated with MM, whereas five variables, namely, H, Ph, P65, PD, and MC, were positively correlated with C. However, PD, MC, and StSC were positively correlated with one another. P65 was negatively correlated with PD, MC, and StSC.

The results of the trial of 2SLS in addition to OLS are shown in Table 8. Model 1) used the least squares method to estimate the explanatory variables associated with MM, but Constant term, C, PD, MC, and StSC were statistically significant with a degree of freedom adjusted coefficient of determination of 0.650. However, as this coefficient may be overestimated, model 1)' was estimated using 2SLS. In the results, only PD was statistically significant, and the degree of freedom adjusted

Table 5 Number of medical institutions per 100,000 population by prefecture

Prefecture	MM	H	C	Ph	DS	P65	PD	MC	StSC
Hokkaido	2.22	10.59	119.60	43.90	12.79	29.1	69.00	66	86296
Aomori	0.46	7.36	109.84	48.70	11.66	30.1	136.00	7	4611
Iwate	0.16	7.39	118.46	47.50	14.23	30.4	84.00	9	7486
Miyagi	1.44	6.06	119.15	50.00	11.95	25.7	321.00	26	11993
Akita	0.49	6.82	124.00	54.10	11.47	33.8	88.00	5	4410
Fukushima	0.10	6.71	117.10	46.90	9.86	28.7	139.00	18	8550
Ibaraki	0.48	6.16	107.82	45.00	12.25	26.8	478.00	7	9248
Tochigi	0.31	5.50	123.94	45.80	12.07	25.9	308.00	21	3658
Gunma	0.15	6.66	131.02	46.30	14.66	27.6	310.00	23	4692
Saitama	1.58	4.75	107.95	39.40	13.85	24.8	1913.00	32	31787
Chiba	2.18	4.65	114.27	39.10	12.48	25.9	1207.00	25	51597
Tokyo	5.09	4.96	181.78	48.50	12.99	22.7	6169.00	452	235893
Kanagawa	4.37	3.80	130.39	42.40	11.57	23.9	3778.00	54	76383
Niigata	0.44	5.78	126.05	50.80	13.42	29.9	183.00	25	12390
Toyama	0.09	10.07	115.02	43.40	14.44	30.5	251.00	18	8448
Ishikawa	0.35	8.36	119.02	46.20	14.34	27.9	276.00	29	3542
Fukui	0.26	8.75	112.31	37.90	15.82	28.6	188.00	8	3120
Yamanashi	0.12	7.28	138.27	55.20	16.63	28.4	187.00	6	1606
Nagano	0.14	6.25	124.55	47.50	10.72	30.1	155.00	41	13250
Gifu	0.45	5.09	127.12	51.70	19.60	28.1	191.00	15	12342
Shizuoka	0.41	4.94	122.78	50.80	12.76	27.8	476.00	32	14820
Aichi	0.98	4.41	123.08	44.70	12.57	23.8	1447.00	73	118286
Mie	0.39	5.60	132.82	45.80	12.82	27.9	315.00	11	13630
Shiga	0.72	4.09	116.29	43.30	12.99	24.2	352.00	7	6250
Kyoto	1.08	6.78	150.99	41.90	11.41	27.5	566.00	28	15376
Osaka	3.93	6.06	161.51	47.30	10.60	26.1	4640.00	146	121068
Hyogo	3.99	6.38	146.64	48.10	10.68	27.1	659.00	46	70485
Nara	2.79	5.66	139.49	41.70	8.90	28.7	370.00	12	4192
Wakayama	0.83	8.57	165.47	52.20	8.26	30.9	204.00	0	2500
Shimane	0.29	7.46	146.01	49.00	10.24	32.5	104.00	5	2124
Okayama	0.58	8.65	140.42	43.80	9.29	28.7	270.00	30	8183
Hiroshima	2.75	8.71	147.76	57.30	10.39	27.5	335.00	84	21238
Yamaguchi	0.22	10.65	142.09	58.50	13.18	32.1	230.00	19	7020
Tokushima	0.13	14.90	156.55	53.00	9.98	31	182.00	16	1155
Kagawa	0.81	9.17	133.24	56.00	12.12	29.9	520.00	22	2346
Kochi	0.55	18.03	129.68	55.40	11.37	32.8	103.00	7	2768
Fukuoka	1.74	9.11	153.15	57.10	13.36	25.9	1023.00	123	44982
Saga	0.12	12.93	134.36	63.40	10.51	27.7	341.00	43	1296
Nagasaki	1.39	11.03	155.43	55.00	8.55	29.6	333.00	33	3944
Kumamoto	0.06	11.94	129.80	48.70	9.80	28.8	241.00	42	8150
Oita	0.35	13.57	130.05	50.10	10.37	30.4	184.00	24	2523
Miyazaki	0.09	12.65	126.46	55.70	10.94	29.5	143.00	13	1368
Kagoshima	0.24	15.30	135.40	55.10	11.66	29.4	179.00	38	2772
Okinawa	1.10	6.46	103.77	39.40	4.19	19.6	628.00	18	600

Note: It was excluded because there are no medical malls in Yamagata, Tottori, and Ehime.

Table 6 Descriptive statistics on the number of medical institutions per 100,000 population by prefecture

	MM	H	C	Ph	DS	P65	PD	MC	StSC
n	44	44	44	44	44	44	44	44	44
Average	1.06	8.09	131.61	48.72	11.90	28.14	688.09	39.9773	24281.32
Standard deviation	1.27	3.30	16.99	5.90	2.49	2.80	1228.34	70.0885	44382.50
Min	0.06	3.80	103.77	37.90	4.19	19.60	69.00	0.00	600.00
Max	5.09	18.03	181.78	63.40	19.60	33.80	6169.00	452.00	235893.00
Median	0.47	7.05	129.74	48.30	11.81	28.50	292.00	23.50	7818.00
Coefficient variation	1.21	0.41	0.13	0.12	0.21	0.10	1.79	1.75	1.83

Note: It was excluded because there are no medical malls in Yamagata, Tottori, and Ehime.

Table 7 Correlation matrix

	MM	H	C	Ph	DS	P65	PD	MC	StSC
MM	1								
H	-0.4359**	1							
C	0.1962	0.2750	1						
Ph	-0.2528	0.5484**	0.4874**	1					
DS	-0.1250	-0.2765	-0.3467*	-0.1117	1				
P65	-0.5067**	0.6501**	0.1474	0.4452**	-0.1737	1			
PD	0.6141**	-0.5301**	0.1459	-0.3116*	0.0241	-0.8045**	1		
MC	0.3897**	-0.0783	0.2777	0.0056	-0.0606	-0.4764**	0.5169**	1	
StSC	0.5498**	-0.5697**	-0.0011	-0.3317*	0.2653	-0.4908**	0.4698**	0.6058**	1

Note: Tests for rank correlation coefficients, * P <0.05, ** P <0.01.

coefficient of determination was 0.408. In addition, in 1)", Constant term and PD were significant, and the freedom adjusted coefficient of determination was 0.599, suggesting that 1)" would be suitable and affected by population density.

Model 2) then used the least squares method to estimate the explanatory variables associated with C; Constant term, P65, and MC were statistically significant with a degree of freedom adjusted coefficient of determination of 0.3990. In calculating model 2)', which employed 2SLS to address endogeneity, three variables were statistically significant, namely, Constant term, H, and PD, and the degree of freedom adjusted coefficient of determination was 0.2056.

Therefore, although medical malls and existing clinics are commonly affected by population density, they differ in that only clinics are affected by the location of hospitals.

3. Increasing effect of clinical departments in medical malls

Table 9 shows the results of DID in which multiple regression analysis was attempted to verify the effect of increasing the number of clinical departments in a medical mall. In model 3), DM was statistically significant but the parameter was negative. This was because the proportion of clinical departments was low overall owing itself to the overwhelmingly smaller number of medical malls compared with the number of existing

Table 8 Results of multiple regression analysis

Objective variable	MM			C	
	1)	1)'	1)"	2)	2)'
	OLS	2SLS	2SLS	OLS	2SLS
H				0.655605	5.470**
				(0.749156)	(1.567)
C	0.01454†	-0.0345			
	(0.008248)	(0.02912)			
PD	0.0004979*	0.001153**	0.0009006**	0.00314497	0.01202**
	(0.0001934)	(0.0002624)	(0.0001157)	(0.00318154)	(0.003104)
P65				2.31193*	
				(0.952345)	
MC	-0.006847†			0.130861*	
	(0.003888)			(0.0516788)	
StSC	1.748e-05*				
	(6.499e-06)				
Const	-1.3510	4.8060	0.4359**	53.8455**	79.08**
	(1.051)	(3.6920)	(0.1464)	(25.4512)	(14.23)
Adj. R^2	0.650	0.408	0.599	0.399075	0.2056
lnL	-47.370	-671.200		−173.199	
n	44	44	44	44	44
Hausman Test		8.20754	3.02738		20.7165
		(0.0165103)	(0.08187)		(3.17293e-005)
Sargan Test			2.59189		0.00270829
			(0.107412)		(0.998647)
IV List		Const, StSC, MC	Const, StSC, MC		Const, StSC, MC, P65, Ph

Note: **p <0.01%, *p <0.05%, †P <0.10%. Numbers in parentheses are standard errors.

clinics.

The proportion of clinical departments was also generally low because the number of medical malls was overwhelmingly smaller than that of existing clinics. Further analysis of the growth rate (difference) of DM showed statistical significance. The growth rate of clinical departments in medical malls increased an average of 3.41% over the past 11 years, even after excluding the effect of the growth rate of clinical departments in all clinics. As shown in Table 10, there was an increase in 28 out of 33 fields in the number of clinical departments of medical malls, with large increases in the following: 9.01% in gastroenterology, 8.92% in allergology, 8.93% in pediatric dentistry, 8.28% in rehabilitation, and 8.43% in orthodontics. Meanwhile, decreases were recorded in five fields: obstetrics and gynecology (-4.76%), pediatrics (-1.51%), otorhinology (-1.37%), diabetes medicine (-1.57%), and breast surgery

Table 9 Results of regression analysis

	3)	4)
	OLS	OLS
DM	−0.0368820*	0.0341241**
	(0.0192202)	(0.00688930)
D19	0.0018300	
	(0.0192202)	
DMD19	0.0306549	
	(0.0271815)	
Const	0.0673062**	0.0008
	(0.0135907)	(0.00487147)
Adj. R^2	0.018	0.237
lnL	151.346	143.389
n	132	66

Note: **p <0.01%, *p <0.05%. Numbers shown in parentheses are standard errors.

Table 10 Increasing effect of clinical departments in medical malls (difference-in-differences design)

Clinical department	Clinics (%)			Medical malls (%)			Difference in differences
	2008	2019	Difference	2008	2019	Difference	
Gastroenterology	11.45	10.33	-1.11	2.40	10.30	7.90	9.01
Allergology	3.78	3.95	0.18	0.00	9.10	9.10	8.92
Pediatric dentistry	23.18	25.15	1.97	0.00	10.90	10.90	8.93
Physical medicine and rehabilitation	7.53	6.66	-0.88	0.00	7.40	7.40	8.28
Orthodontic dentistry	12.72	13.89	1.17	0.00	9.60	9.60	8.43
Internal medicine	37.77	36.75	-1.02	20.00	26.60	6.60	7.62
Dermatology	7.44	6.55	-0.89	7.00	13.10	6.10	6.99
General surgery	9.16	7.49	-1.67	1.00	5.80	4.80	6.47
Psychosomatic medicine	2.26	2.52	0.26	0.00	6.70	6.70	6.44
Oral and maxillofacial surgery	11.85	15.15	3.30	0.00	9.10	9.10	5.80
Cardiology	7.77	7.44	-0.32	1.00	6.40	5.40	5.72
Psychiatry	3.37	3.72	0.35	2.00	6.80	4.80	4.45
Respiratory medicine	4.66	4.45	-0.21	0.00	3.90	3.90	4.11
Dentistry	39.81	39.02	-0.78	16.00	19.40	3.40	4.18
Rheumatology	2.42	2.42	-0.01	0.00	3.90	3.90	3.91
Gynecology	1.28	0.92	-0.36	0.00	3.10	3.10	3.46
Ophthalmology	5.02	4.30	-0.72	8.00	10.90	2.90	3.62
Colorectal surgery	2.12	1.76	-0.37	0.00	1.90	1.90	2.27
Radiology	2.98	1.93	-1.05	0.40	1.50	1.10	2.15
Aesthetic plastic surgery	0.59	0.59	0.00	0.40	2.60	2.20	2.20
Orthopedic surgery	7.74	7.11	-0.63	7.00	8.40	1.40	2.03
Neurology	2.03	1.65	-0.38	0.40	1.90	1.50	1.88
Plastic and reconstructive surgery	1.11	1.01	-0.10	2.00	3.70	1.70	1.80
Neurosurgery	0.94	1.01	0.07	0.00	1.30	1.30	1.23
Obstetrics	0.24	0.16	-0.08	0.00	0.90	0.90	0.98
Urology	2.32	2.03	-0.29	3.00	3.60	0.60	0.89
Anesthesiology	1.36	1.12	-0.24	1.00	1.40	0.40	0.64
Pediatric surgery	0.20	0.21	0.01	0.00	0.10	0.10	0.09
Breast surgery	0.22	0.48	0.26	0.40	0.00	-0.40	-0.66
Endocrinology and metabolism	1.14	2.31	1.17	0.40	0.00	-0.40	-1.57
Otorhinolaryngology	3.51	3.08	-0.43	9.00	7.20	-1.80	-1.37
Pediatrics	13.47	11.28	-2.19	12.00	8.30	-3.70	-1.51
Obstetrics and gynecology	2.12	1.68	-0.44	7.00	1.80	-5.20	-4.76
Overall average	7.08	6.91	-0.16	3.04	6.29	3.25	3.41

Note: We targeted 33 clinical departments that can capture data from clinical departments in medical malls.

(-0.66%).

(4) Discussion

We focused on inter-clinic competition and analyzed the location and distribution of clinical departments in medical malls and existing clinics.

First, through a thorough survey of medical malls, we uncovered the fact that clusters of clinics were formed around Japan's leading economic zones. As of November 2019, Japan had 2,501 medical malls, with 11,408 business establishments operating in them (Table 3). Of these establishments, 9,539 were clinics, including dentists, and 1,869 were pharmacies, accounting for 5.6% of all clinics and 3.1% of all pharmacies in the country.

In addition, we conducted an ABC analysis on the number of medical malls by prefecture to clarify the location distribution of

these malls. The results showed that 80% were located in prefectures with large economies, such as Tokyo, Kanagawa, Osaka, Hyogo, Chiba, Hokkaido, and Saitama. The distribution of locations was clearly biased compared with the existing clinics (Figs. 1 and 2). As discussed above, clusters of clinics can be interpreted as occurring mainly in urban areas rather than equally across the country. Given that medical malls are opening without government subsidies, medical malls may have economic rationale and may offer incentives to attract physicians within these areas.

Second, our analysis of the factors influencing the number of medical malls suggests that the magnitude of the population density is related to the number of malls. To examine whether the location of a medical mall was accidental or a consequence of strategic behavior, we ran a multiple regression analysis on factors related to the number of medical malls. The results suggested that both medical malls and existing clinics were affected by population density, whereas existing clinics were also affected by the location of hospitals (Table 8). Thus, although the impact of population density on both medical malls and existing clinics is only a natural consequence, medical malls are not affected by the location of hospitals.

Recently, to cope with the aging of the population, the Japanese government has been shifting its strategy to the provision of comprehensive medical care by many clinics. It has been giving incentives for medical treatment fees with the aim of strengthening the functions of primary care physicians and enhancing home medical care as receivers of patients discharged from hospitals (Kaneko and Matsushita, 2017). Therefore, existing clinics inevitably tend to be located around hospitals, to promote smooth cooperation with hospitals.

However, medical malls are also likely to open strategically in locations where hospitals have not entered the market to avoid competition from hospitals. These locations are those near stations and shopping malls that have high levels of human traffic and are convenient for living and transportation. Another reason for clinics becoming clusters is that clustering is a strategic way to reverse the problem of transaction costs that arise in clinic management (Macher and Richman, 2008). In Japan, under the government's leadership, the high hurdles of setting up hospitals and hospital beds to control the country's overall health care costs, fluidity of hiring medical staff, high cost of maintaining physician personnel and medical equipment, and other factors, make the transaction costs of expanding internal organizations very high. Meanwhile, these regulations can work to the advantage in clinics. As a rule, management resources traded in health care are limited to goods and services that have undergone rigorous review and approval by the state. Thus, the cost of procuring them through the market is low. Clinics can be expected to strengthen their management while controlling transaction costs by purchasing the necessary resources from the outside (market). This situation can explain the incentives for clinics to consolidate geographically and is reflected in the results of these analyses.

Third, our analysis of the growing number of clinical departments in the medical malls revealed that there is an increase in the number of specialty departments that are different from existing clinics. To verify the effect of increasing the number of clinical departments in medical

malls, we compared and analyzed the distribution of clinical departments in medical malls and existing clinics. In the past 11 years, the number of clinical departments in medical malls increased by an average of 3.41% (Table 9). For example, among 33 departments, the number increased in 28 departments, including gastroenterology, allergology, pediatric dentistry, rehabilitation, and orthodontics. In 2008, medical malls consisted mainly of the major clinical departments existing in existing clinics, such as internal medicine, general dentistry, and pediatrics. In 2019, however, the clinical expertise was increasingly distributed among multiple clinical departments in addition to these major ones (Table 10).

Based on the above results, specialists in these departments may establish themselves in medical malls to differentiate themselves from other clinic doctors. Presently, the number of clinics, including dental clinics, has reached 170,000, indicating the market is saturated. The government's fiscal restraint on health care funding and negative revisions to reimbursement rates have made the operation of clinics even more difficult.

If general practitioners have a competitive advantage in these market conditions, they should have an incentive to choose a location with high population density and efficient customer acquisition potential, or to choose a specialty with fewer competitors. However, the hurdle for a specialist who has worked as a hospital doctor to open a new practice in an urban area is extremely high. The initial cost of accessible locations is too great owing to high land prices and rents. However, practitioners can open a medical mall with low initial costs and provide high-quality, highly specialized medical care by building complementary relationships with other specialists and pharmacies. This is expected to stabilize the ability to attract customers and revenue (Epstein, 2016). By maximizing the strengths of these medical malls, these medical practitioners may be developing a differentiation strategy against existing clinics.

(5) Conclusion

We conducted a thorough survey of medical malls in Japan to explore the factors that contribute to the clustering of clinics. The results of the analysis indicated the following. In the Tokyo metropolitan area, Osaka, and Hokkaido, where competition among clinics is fierce, medical malls have been developed under a cluster strategy in order for specialists in clinics to have a competitive advantage; 80% of all medical malls are concentrated in these areas. Considering that the medical mall is located in a place with convenient transportation and overall access in the city, it can be expected to improve the access to medical care on the patient side, which is particularly advantageous for specialists as well. Therefore, if a medical specialist opens a clinic in a medical mall, then they may be able to differentiate their practice from existing clinics.

Based on the above, the medical mall can be construed to operate strategically in terms of location and clinical departments, confirming the presence of functioning competition. However, the findings obtained from this analysis only revealed parts of the strategy and management behavior of medical malls from the difference in distribution of location and clinical departments. In addition, we have not clarified that competition between clinics works effectively, and it does not guarantee low cost, quality medical care, or soundness of clinic

management. However, we would emphasize that the value of the present study as a pilot study demonstrating the need for empirical studies in each local area in the future is not compromised by the fact that it illustrates well the national cases where clusters of clinics are occurring. It is necessary to analyze in detail the management behavior of medical malls in a limited area in the future.

For a long time, research has noted that the formation of industrial clusters contributes significantly to the enhancement of competitiveness and growth of firms and economies, and a similar phenomenon has been discovered in the clinic health care market. In particular, the formation of clusters of clinics could solve efficiency and productivity problems by strengthening management. Further surveys must be conducted to clarify these problems, and future research should undertake empirical analyses.

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References

Akerlof, A.G. (1970). The Market for "Lemons": Quality Uncertainty and the Market Mechanism, *The Quarterly Journal of Economics*, 84(3), pp. 488-500.

Hill RN and Hack W. (1985). The medical mall design as an answer to hospital cost control, *The Journal for Hospital Governing Boards*, 38(2), pp.21-23.

Ito, A. (2010). Wagakuni ni okeru Iryoumo-ru no Suishin Seibi Zyoukyo to Manegimento Kadai(Current situation of medical complex in Japan: its growth and managerial problems), *Jiyugaoka Sanno College bulletin*, 43, pp.49-68. (in Japanese)

Ito, A. (2016 a). Medical Malls: Assessing Willingness to Consult and Services Anticipated, *Health Economics & Outcome Research: Open Access*,2(2), pp.1-9.

Ito, A. (2016 b). Medical mall founders' satisfaction and integrated management requirement, *International Journal of Health Planning and Management*, 32(4), pp.449-466.

Ito, A. (2020). Identifying Motivational Factors to Visit a Medical Mall by Conjoint Analysis, *International Journal of Japan Academic Society of Hospitality Management*,6(1), pp.1-10.

Jankowiak, H. Anna. (2011). Cluster models in Japan on the example of Toyota cluster, *Research Papers of Wroclaw University of Economics*,191, pp.173-181.

Jennifer, B. (2011). What Opportunity Does the Medical Mall Healthcare Model Present?, https://.daviswince.com/2011 medical-malls/(accessed on 8 May2020).

JMA Research Institute Inc., Medical Malls, *MDB Market Research Report*, https://www.jmar-bi. com/report/00060I.html(accessed on 8 May 2020). (in Japanese)

Johanna, E. (2016). Going to the medical mall: A patient retention strategy not to be confused with storefront clinics, *hospital Review*, https://www.beckershospitalrevie w.com/human-resources/going-to-the-medical-mall-a-patient-retention-strategy

-not-to-be-confused-with-storefront-clinics.html(accessed on 9 August 2019).

Josi, R and Pietro, C. (2019). Skill mix in Swiss primary care group practices - a nationwide online survey, BMC Family Practice,20(39), pp.1-11.

Kaneko, M and Matsushima, M. (2017). Current trends in Japanese health care: establishing a system for board-certificated GPs, *British Journal of General Practice*,67(654), p.29

Lin C.H, Chin S. Chen and Liu C. T, et al. (2006). Differences in Practice Income between Solo and Group Practice Physicians, *Health Policy*, 79(2-3), pp.296-305.

Ministry of Health, Labour and Welfare. (2014). Survey of Medical Institutions,*2014 Summary of Static/Dynamic Surveys of Medical Institutions and Hospital Report*, pp7-30

Matsuda, S. (2019). Health Policy in Japan-Current Situation and Future Challenges, *JMA Journal*, 2(1), pp.1-10.

Macher T. J. and Richman, D. B. (2008). Transaction Cost Economics: An Assessment of Empirical Research in the Social Sciences, Business and Politics,10,1, pp.1-63.

Motoyama, Y. (2008). What Was New About the Cluster Theory? What Could It Answer and What Could It Not Answer? *Economic Development Quarterly*,22, 4, pp.353-363.

Porter, E. M. (1998). Clusters and the New Economics of Competition, *Harvard Business Review*, November-December 1998 Issue,https://hbr.org/1998/11/clusters-and-the-new-economics-of-competition (accessed on 14 September 2020).

Porter, E. M and Teisberg, O. E. (2006). *Redefining Health Care Creating Value-Based Competition on Results*, Massachusetts : Harvard Business Press.

Pines, U. L, Mehrotra, A and Ramya, C. (2013). On call at the mall : a mixed methods study of U.S. medical malls, *BMC Health Service Research,* 13(471), pp.1–8.

Wald, T.J, Schrand, L. S, Hayes, L. D et al. (2018). Mayo Clinic Care Network: A Collaborative: Health Care Model, *Journal of the American College of Radiology*,15(1), pp.167-172.

Welch WP, et al. (2013). Proportion of physicians in large group practices continued to growth in 2009-11. *Health Affairs*, 32(9), pp.1659 - 1666.

Yamawaki, H. （2002）. The Evolution and Structure of Industrial Clusters in Japan, *Small Business Economics*,18, pp.121–140.

Yano Research Institute Ltd., Current Status and Prospects of Medical Mall Business, https://www.yano.co.jp/market_reports/C54104600 (accessed on 8 May 2020). (in Japanese)

Yoshida, A and Kohno, S. (2007). Ibaragiken ni okeru Shinryogyokan no Kukanteki kyousou (Spatial Competition among Clinics in Ibaraki Prefecture), *Journal of the Japan Statistical Society. Japanese issue*, 37(1),pp.133-150. (in Japanese)

Zwiep, M. T, Greenberg A. J and Balaa, F, et al. (2018). Impact of group practices on patients, physicians and healthcare systems : protocol for a scoping review, *BMJ Open*, 8,pp.1-3.

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