한국조경학회지 46(1) : 17~28, 2018. 2.
J. KILA Vol. 46, No. 1, pp. 17~28, February, 2018
pISSN 1225-1755 eISSN 2288-9566
https://doi.org/10.9715/KILA.2018.46.1.017

아파트 단지 내의 주민공동시설 현황과 선호 비교연구†

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Community Facilities in Apartment Complexes - Whether Provisions Match Residents' Preferences -

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ABSTRACT

In Seoul, the capital of South Korea, developers of apartment complexes are responsible for including community facilities - senior citizen centers, child care centers, small libraries, and so forth - according to the current Regulations on the Housing Construction Standard Article 2 and 55. These standards have long required certain community facilities, depending on the number of households in each apartment complex, without fully considering whether such provisions meet that community's needs. In this study, we aimed to reveal whether the current provision of community facilities responds to local preference. We conducted surveys of residents in randomly selected ten apartment complexes in Seoul to determine residents' preferences on community facilities using the analytic hierarchy process (AHP). We then compared the survey results with these complexes' current facilities. Our findings showed mismatches between residents' preferences and provisions: outdoor sports facilities, child care centers, and small libraries were found to be strongly preferred, but not provided in some apartment complexes within the study, whereas less-preferred facilities such as senior citizen centers were provided in all complexes. Through this study, we could conclude that current standards regarding the provision of community facilities in Seoul's apartment complexes should be altered to reflect the preferences of residents in apartment complexes.

Key Words: Analytic Hierarchy Process, Demand, Procurement

국문초록

서울시에서는 주택건설기준 등에 관한 규정 제 2조와 55조에 따라 아파트 단지 개발 시 경로당, 어린이집, 작은 도서관

†: 이 논문 또는 저서는 2017년 대한민국 교육부와 한국연구재단의 지원을 받아 수행된 연구임(NRF-2017S1A5A8020226).
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등의 주민공동시설을 설치해야 한다. 이러한 기준은 해당 조항이 지역 사회의 필요를 충족시키는 지에 대한 충분히 고려 없이 각 공동 주택의 가구 수에 따라 주민공동시설을 요구해왔다. 본 연구는 현재 주민공동시설의 설치 현황과 주민들의 선호도에 대한 일치 여부를 밝혀내는 것을 목표로 한다. 연구 대상지는 서울에 위치한 아파트 단지 중 층화 임의 선정한 10개이며, 각각의 아파트 주민들을 대상으로 설문 조사를 수행하였다. 주민공동시설에 대한 선호도를 분석적 계층화 방법(AHP)을 사용하여 분석하고, 설문 조사 결과를 복합 단지의 현재 시설 현황과 비교하였다. 연구 결과, 거주자들의 선호와 조항 사이에 불일치가 나타났다. 주민운동시설, 어린이집 및 작은 도서관이 강하게 선호되었지만, 연구 내 일부 아파트 단지에서는 제공되지 않으나, 경로당과 같은 선호도가 낮은 시설은 모든 단지에 제공되었다. 따라서 아파트 단지의 거주자 선호도를 반영하여 서울 아파트 단지의 주민공동시설 제공에 관한 현행 기준을 변경해야 할 것이다.

주제어: 분석적 계층화 방법(AHP), 수요, 조달

Ⅰ. Introduction

Apartments, or high-rise multifamily residential building that contains both rent and owners' units, comprise the most common type of housing in Seoul, the capital of the South Korea. Starting with the Mapo apartment complex in 1962, Seoul witnessed a remarkable increase in this housing type from the 1970s to the 1990s, accommodating a greater population within its scarce landmass (Jung and Park, 2012; Shin *et al.*, 2012; Kim and Kim, 2014). In the following decades, from the 1990s to the present, the proportion of apartments over all other housing types has risen from 22.7% to 59.0% (Population and Housing Census, 2014).

Community facilities were not originally a consideration when apartment complexes were developed mainly to meet the city's housing demand. It was only after the city reached sufficient housing supply and began suffering from an economic downturn in the 1990s, when apartment developers turned their attention to including community facilities within housing complexes, to be more competitive in the historically slow real estate market. By providing diverse types of community facilities, developers aimed for advantages in attracting homebuyers. Residents came to value such amenities and have considered those as part of their decision criteria in buying homes (Kim *et al.*, 2005; Shin *et al.*, 2006; Kim and Min, 2008; Choi and Lee, 2011; Kim and Kim, 2014).

While Seoul's real estate market has diversified the supply of community facilities, regulators have been slow to account for such changes, and have not necessarily reflected residents' desires. Regulations on the Housing Construction Standard Article 2 have, since 1991, mandated that developers provide certain community facilities, depending on the size of the complex: Senior citizen centers, senior center gardens, child care centers, playgrounds, small libraries, and sports facilities (see Table 2)(Paik *et al.*, 2015). The current regulation does not require further exploration of residents' preferences, community demand, or community demographics, but rather rely on simple formulas related to building size. While community facilities have drawn the attentions of developers and housing scholars, extant studies have been limited concerning examining residents' preferences or separate provisions of community facilities (Choi, 2006; Shin *et al.*, 2006; Park and Lee, 2009; Song 2009; Kim and Kim, 2014).

Recently, the value of community facilities has been considered as important factors to both residents and developers in the real estate market. In this backdrop, the purpose of this study is to assess whether the provision of community facilities provided by apartment complexes are consistent with the needs and preferences of residents. In this study, we first identify which types of community facilities are preferred by residents, then investigate whether those specific facilities were included in those residents' apartment complexes. For the first line of the inquiry, we survey preferences on the six major community facilities listed above to apartment complex residents randomly sampled in Seoul, via a questionnaire, and analyze the results using the analytic hierarchy process (AHP). Then, for the second line of inquiry, we compare the result with the actual provision of such facilities through investigating the sites and construction documents of apartment complexes.

Ⅱ. Background and Literature Review

1. Definition of and Regulation on Community Facilities

Community facilities are defined formally as a set of communal welfare amenities for residents in residential complexes

with more than 150 household units mandated by the Article 2 and 55 of the Regulations on the Housing Construction Standard (Regulations on the Housing Construction Standard Article, 2015). Under the rule, housing developers are required to provide certain types of community facilities of which the total area should mount to at least 2.5 square meters or 2 square meters per housing unit, for a complex with less than 1,000 housing units or more than 1,000 housing units, respectively. Senior citizen centers and gardens, playgrounds, child care centers, sports facilities, and small libraries are mandatory, while education centers, training facilities for teenagers, restrooms, study rooms, assembly halls, public kitchens, public laundry rooms, and social welfare facilities are optional. The regulation allows leeway, in that some of the facilities can be omitted upon the discretion of developers and the approval of local authorities if similar facilities had been already supplied sufficiently in the neighborhood (ibid.).

Detailed regulations of community facilities in apartment complexes are shown in Table 1.

2. Review of Previous Studies

Research has largely emphasized the positive effects of community facilities, deemed to facilitate communication and social activities among residents in apartment complexes (Ju *et al.,* 2002; Kwon and Choi, 2009). This increased opportunity for interaction among residents has been proven to lead to greater satisfaction in their living environments (Hur and Morrow-Jones, 2008). McMillan and Chavis (1986) proposed a definition of sense of community including four elements: First, membership means the feeling of belonging; Second, influence means that member have power to community and community have power to members; Third, integration and fulfillment of needs means that community fulfill members' need; Finally, shared emotional connection means that the constant contact between the members creates high-quality interaction. The sense of community forms psychological boundary providing emotional safety and satisfaction about apartment community (Kim and Kaplan, 2004). Therefore, there is a need for a community facility where residents can continue to use and interact with each other.

Some studies have attempted to reveal the demand for community facilities in apartment complexes. In general, residents prefer outdoor facilities, such as outdoor sports areas, promenades, and rest areas, as well as accommodations for children and education, playgrounds, child care centers, and small libraries (Song, 2009; Shin *et al.,* 2011; Kim and Kim, 2014). Preference differs by age group. While outdoor facilities are the most favored among people over 40, people who are between 30 and 40 - the most likely age group of parents with young children - highly prefer playgrounds (Shin *et al.,* 2006). Senior citizen centers are the least preferred community facilities by all age groups (Cho and Kang, 2001; Shin *et al.,* 2006).

Some studies have focused on the provision of community facilities. Regulations on the Housing Construction Standard

Table 1. Community facilities requirements by the regulations on the Housing Construction Standard

Scale of apartment complex	Required community facility	Detailed requirements
More than 150 households	Senior citizen center	- 50m^2+(number of household 0.1m^2) - Garden in senior citizen center must be installed
More than 300 households ① More than 1,000 households ② 600~1,000 households ③ 300~600 households	Child care center	① Area must accommodate more than 80 children ② 30 children + number of households 0.05 children ③ Number of households 0.1m^2
More than 500 households	Sports facility	- According to "Enforcement Ordinance of Use: Installation of Sports Facility," area must be followed by the each sports facility standard
More than 500 households	Small library	- Small library must be installed according to the additional clause of the "Library Enforcement Ordinance"; surface area must be around 100m^2
More than 150 households, ① 300~1,000 households ② 150~300 households	Playground	① 200m^2+(number of household 1m^2) ② Playground must be installed with appropriate area according to regional and residential characteristics.

※ Total area requirement for community facilities in one apartment complex
100~1,000 households: Number of households 2.5m^2 > 1,000 households: 500m^2+(number of households 2m^2)
※ The mandatory community facilities have been required since 1991, but detailed requirements have been amended since then at a marginal level. The detailed requirement of the table is the current requirement standard as of 2017.

Aritcle 2 require developers to provide the six community facilities mentioned above, but, according to the studies, these standards have not been strictly followed. Senior citizen centers and playgrounds are mostly provided as required, but child care centers and small libraries are frequently omitted (Shin *et al.*, 2006; Kim and Min, 2008; Kim *et al.*, 2011).

Ⅲ. Analytical Plan

Our study sites comprise ten apartment complexes, a stratified random sample from population apartments in Seoul built after 2000 and containing more than 500 households in each. We selected relatively newer and larger apartment complexes, as they would have been built after the Housing Construction Standards that required the provision of the six aforementioned community facilities. To avoid geographic bias in selecting the sample, we divided Seoul into the two geographic parts with Han River as the baseline. Then we conducted randomized selections from each strata. Figure 1 maps the locations of our ten sample apartment complexes in Seoul. The details of each site, including address, name, year built, number of households, and exclusive area, are described in Appendix 1.

To compare preferences with the provisions of community facilities, we first conducted user surveys and analyzed those with an analytical hierarchy process (AHP) to deduce the level of preference for each facility. We then investigated the current status of the provision in each of the study sites. As mentioned previously, there are a minimum of six community facilities required by current regulation; However, since sports facilities can be installed in outdoor or indoor spaces, we treated those as two separate types to obtain more detailed preferences.

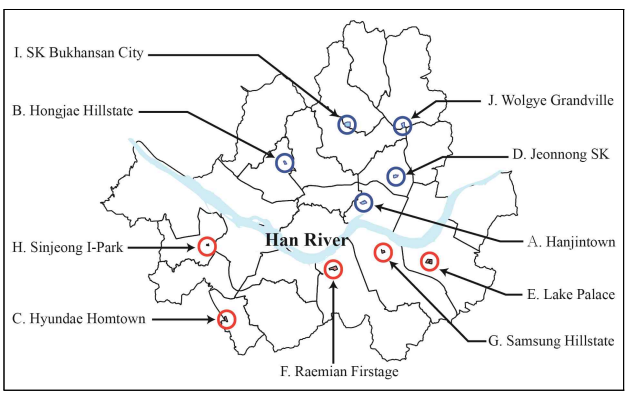

Figure 1. Study sites in Seoul

Subsequently, we examined the preference and provision of the seven types of community facility surveyed.

1. Step 1: Questionnaire Survey

We conducted questionnaires among residents in the sample apartment complexes listed in Appendix 1. The main questions are (a) whether the respondents recognize the existence of community facilities in their apartment complex, and (b) which facilities they consider more important than others. For the second set of questions, we used the AHP question format to examine the importance/preference (weights) via a bilateral comparison of the seven community facilities. Additionally, as background information, we asked for gender, age, family composition, housing unit size, and annual household income of the respondents.

We intentionally selected housewives or heads of households to gather opinions that represent all family members. Diverse family structures exist around them: Sometimes respondents live with kids in different age groups, or they live with their parents. We assumed that they are aware of each family member's everyday routine, which would include the use of the facilities in their apartment complex, and could establish the order and magnitude of importance of those for all family members.

The face-to-face survey was conducted on site between 1 p.m. and 5 p.m., weekdays and weekends from May 1 to June 6, 2015. There were 150 total participants, 15 in each site. In the questionnaire survey, we asked the respondents to evaluate the preferences of the facilities, as if their apartment complex has all of the seven community facilities. Since the subject facilities, such as child care center, indoor sports facility, outdoor sports facility, small library are common and ubiquitous in Seoul, the respondents would not have difficulties in evaluating their importance even some of those were not provided in their complex. Out of 150 households, 100 were valid after excluding the ones with low consistency index and consistency ratio (CI, CR < 0.15). The final sample comprises of 84% female and 16.67% male at an average age of 40.68. Respondents have been living in their current place for five to ten years, and apartment unit size is an average of 105.79m^2. The average annual household income was 49,690,000.93 Korean won, or $42,343 in U.S dollar in 2016. Appendix 2 shows the sample questionnaire.

2. Step 2: Community Facility Provision

We investigated whether the seven mandatory community facilities were present, as provided by current regulation. We obtained the information on the types and quantities of community facilities from the managing office of each apartment complex.

Ⅳ. Research Method

An analytic hierarchy process (AHP) is a mathematical method that deals with complex decision making with multiple criteria (Saaty, 1990). AHP has two advantages: First, by pairwise comparison, we are able to deduce weights on each preference and establish priorities among all alternatives (Wind and Saaty 1980). Second, AHP does not require a large sample size because it mainly examines experts who understand the problem (Oh *et al.,* 2015).

We applied AHP to our study questions, investigating the residents' preferences for community facilities. First, we created a decision hierarchy structure to classify decision-making criteria. In the evaluation criteria, we classified the facilities into indoor and outdoor facilities. For alternatives, we listed the seven major community facility types: Senior citizen center, senior citizen center garden, child care center, small library, playground, indoor sports facility, and outdoor sports facility. Figure 2 shows our decision hierarchy structure.

Second, we made a pairwise comparison. We asked participants to compare and state the strength of their preferences one by one using a scale of one to nine, based on a previous study by Saaty (1990). A pairwise comparison implies the reciprocal condition: For example, if one considers an outdoor sports facility to be much more important than a playground, the outdoor sports facility would get nine points, and the playground would get point 1/9. Table 2 describes the level of importance for each scale. The standard process includes calculation of geometric mean of each response to create a total pairwise comparison matrix (A), from which we are able to deduct the relative weights of each community facility.

Third, we computed the weights of stated importance of each facility from the survey responses. We used eigenvalue method, whereby we solve for maximum eigenvalue of the matrix (λ_{max}), and the vector of weight (W) that satisfies $AW=\lambda_{max}W$, using simultaneous equation. If A is perfectly consistent, the maximum eigenvalue of the matrix becomes n, with all other values becoming 0. However, in real life data, the respondents' answers are often inconsistent, therefore, $(\lambda_{max}-n)$ is not always zero but the value increases when the consistency becomes lower. Based on this property, and using consistency index (CI), consistency ratio (CR), and random index (RI), we discern whether the weights derived by pairwise comparison are consistent in a set of responses from an individual. When CI and CR values are 0.15 or less, the result of a pairwise comparison is trustworthy (Saaty, 1990). The CI value is calculated using the following equation, where n is the number of alternatives to be compared.

Table 2. Scales of nine for pairwise comparison

Scale of importance	Definition
1	Equal importance
3	Moderate importance of one over the other
5	Essential or strong importance of one over the other
7	Very strong importance of one over the other
9	Extreme importance of one over the other
2, 4, 6, 8	Intermediate values between the two adjacent judgments

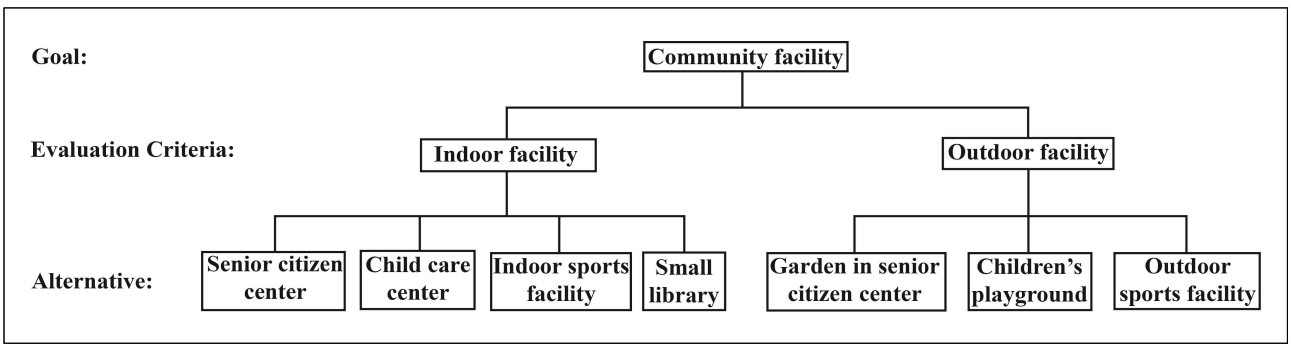

Figure 2. Hierarchy structure for evaluating community facilities

$$CI = \lambda_{\max} - n/(n-1)$$

The CR is another indicator of the consistency, calculated as the ratio of CI to RI (CR=CI/RI). The RI is the average CI of the sets of judgments (scaled from one to nine) for randomly generated reciprocal matrices (Saaty, 2004).

V. Results

1. Importance (Preference) of Community Facilities

In Table 3, we present the relative weight and ranking of each community facility deduced from the AHP analysis.

2. Consistency Test

As an example, we could compute CI for the survey response of three outdoor community facilities in one sample apartment using the following equation:

$$CI = \lambda_{\max} - n/(n-1) = (3.16-3)/(3-1) = 0.08$$

To calculate the CR, we should have the value of the RI, which is 0.58 since the hierarchy of outdoor community facility contains three items being compared. We could calculate CR using the following equation:

$$CR = CI/RI = 0.08/0.58 = 0.14$$

We could compute CI for the survey response of the four indoor community facilities in one sample apartment using the following equation:

$$CI = \lambda_{\max} - n/(n-1) = (4.40-4)/(4-1) = 0.15$$

To calculate the CR, we should have the value of the RI, which is 0.90 since the hierarchy of indoor community facility contains four items being compared. We could calculate CR using the following equation:

$$CR = CI/RI = 0.15/0.90 = 0.15$$

We found that users of community facilities valued outdoor facilities more than indoor facilities by a small margin: The average importance of outdoor and indoor facilities was found to be 0.55 and 0.43, respectively. Among all facilities, those oriented to children or youth were more preferable than those for the elderly. Among outdoor facilities, playgrounds were deemed the most important, followed by the outdoor sports facilities, then senior center gardens, of which the relative rate was 0.49, 0.30, and 0.15, respectively. Among indoor facilities, residents preferred child care centers the most (with an average weight of 0.27) and senior citizen centers the least (0.20). That said, compared to outdoor facilities, the stated preference for indoor facilities was relatively even throughout all items compared.

3. Provision of the Community Facilities

Table 4 summarizes the provision of community facilities mandated by the current regulation.

Among the seven community facilities, senior citizen centers and playgrounds were provided to all the apartment complexes in the sample. Eight out of the ten complexes had child care centers and outdoor sports facilities. The other three facility types are less consistent: Four complexes have indoor sports facilities, four have small libraries, and only one has a senior citizen center garden.

In sum, the 10 apartments in the sample have two to six

Table 3. Average weights and ranking of community facilities

Category	Weights	Category	Weights	Ranking
Outdoor facilities	0.55	Playground	0.49	1
		Outdoor sports facilities	0.30	2
		Garden in senior citizen center	0.15	3
Indoor facilities	0.43	Child care center	0.27	1
		Small library	0.25	2
		Indoor sports facilities	0.22	3
		Senior citizen center	0.20	4

Table 4. Provision of community facilities mandated by the current regulation (Unit: m^2)

Apartment complex	Community facility						
	Senior citizen center	Child care center	Children's playground	Indoor sports facility	Outdoor sports facility	Small library	Garden in senior citizen center
A	220.00(1)*	355.78(1)	3,392.78(7)	275.00(1)	1,923.00(3)	150.00(1)	0
B	117.00(1)	213.00(1)	1,307.37(3)	0	836.49(2)	0	62.10(1)
C	147.99(1)	648.00(1)	1,257.55(4)	0	0	0	0
D	263.61(1)	0	1,225.80(4)	0	1,030.60(3)	75.23(1)	0
E	332.00(1)	191.83(1)	4,480.00(6)	0	3,362.00(6)	0	0
F	396.69(1)	760.40(1)	3,082.92(4)	781.72(3)	2,352.94(1)	890.85(1)	0
G	131.13(1)	176.45(1)	1,915.10(4)	93.10(1)	1,210.80(3)	402.37(1)	0
H	121.50(1)	0	828.00(2)	0	0	0	0
I	777.60(1)	836.22(1)	6,312.80(13)	330.48(1)	1,299.90(3)	0	0
J	483.00(1)	490.81(1)	3,310.00(8)	0	2,257.79(4)	0	0

* Numbers in parentheses indicate the number of such facilities within each complex.

community facilities. This uneven provision might be due to the leeway of the regulation - mentioned in the background section.

4. Comparison between Preference and Procurement

Among the three most preferred community facilities - playgrounds, child care centers, and outdoor sports facilities - only playgrounds are provided in all the ten sample apartment complexes, while child care centers were absent in two of the ten apartment complexes, as were outdoor sports facilities. Considering our sample is random and represents entire apartment complexes in Seoul built after 2000 and containing more than 500 households within them, this result suggests that approximately 20% of apartments lack these two community facilities, despite a higher preference from residents.

Small libraries, ranked as the forth in terms of overall preference, were present in only four apartment complexes within the sample. Senior citizen centers, ranked as the sixth, is fully provided within all ten sample apartment complexes, which would suggest that such facility may not be fully utilized by residents. Indoor sports facilities and senior citizen center gardens are also less important to residents, and their provision rates are low. Since it is the developers' choice as to whether they provide indoor or outdoor sports facilities so long as the total area provided satisfies the requirement, developers may have chosen to build those more often in outdoor spaces due to higher costs incurred in appropriating indoor spaces. It is also possible that developers might be aware of residents' low preference for indoor sports facilities before they choose to supply outdoor facilities, but this claim cannot be supported by any evidence.

Ⅵ. Conclusion

In this study, we examined residents' preferences on community facilities in apartment complexes across Seoul, containing more than 500 households and built after 2000, and compared the result with the current provisions to infer whether the supply meets the demand.

Our results agree with the results of extant studies we reviewed. In terms of the demand, we found that outdoor facilities are more favored by the residents in apartment complexes than indoor facilities. Among outdoor facilities, residents preferred playgrounds the most. Among indoor facilities, they preferred child care facilities the most. In sum, facilities for younger family members and those that aid outdoor physical activity are more preferable than other facility types. In terms of the supply, we found that small libraries, child care centers, senior citizen center gardens, and outdoor sports facilities were not provided even the current regulation - the Regulations on the Housing Construction Standard - required. Since there is no clear regulation for indoor sports facilities, they were present in only two out of ten sample apartment complexes.

Comparison of supply and demand reveals that apartment complexes in Seoul offer facilities that are preferred by users in general. Particularly, playgrounds, the most favored com-

munity facility, are provided in all the sample apartment complexes; however, there is also a mismatch between supply and demand in community facilities. Some of the highest ranked community facilities in terms of importance - child care centers, outdoor sports facilities, and small libraries - were absent from the sample apartment complexes surveyed. On the contrary, some of the less preferred community facilities, such as senior citizens centers, were fully provided even though their importance was weighted lower by residents in the study.

Although supporting evidence for rationales behind preference patterns is beyond the scope of this study, we found some clues from extant studies. Community facilities for children are highly preferred, as young mothers have increased their economic and social activities from the past decade and found convenience in taking advantage of on-site child-care facilities (Choi *et al.,* 2000; Kim and Hwang, 2016). On the other hand, facilities for the elderly, such as senior citizen centers and corresponding gardens, have the lowest preference despite the long history of being the most common among mandatory community facilities within apartment complexes since the Housing Construction Standards were enacted in 1991. From that point until now, senior citizen centers have been built to meet size requirements ($100m^2$; apartment containing 500 households), and located in a multipurpose buildings which also contain management offices, study rooms, indoor sports facilities and so forth. This setting does not offer a pleasant environment for senior citizen to enjoy companionship with their fellows. Also, the construction of senior citizen centers does not provide for programming or activities for senior citizens (Kim and Oh, 2013; Kang and Lee, 2015). Since there is an expansion of alternative activities for senior citizens such as strolls, driving, and tours (Hur, 2002, Song and Um, 2008), demand for simple gathering places like senior citizen center might be low.

Considering the preferences above, it is clear that the current provision of community facilities does not correspond to demand. The highly preferred child care centers were not fully provided because of upfront costs and high ongoing maintenance fees (Bang, 2014; Choi, 2015). Regardless, equally expensive senior citizens were fully provided despite its low level of preference. It has long been a general practice to install senior citizen centers in apartment complexes since the 1991 mandate, and it is likely that developers have not been aware of the decline in demand for such facilities, given an increase in outdoor leisure activities for senior citizens.

We also acknowledge that the finding is not free of limitations inherent to the sampling. We assumed that the household and their wife would be the one who could speak for the real preference of all family member, based on their closer observation on other members' daily routine. In answering the preference on behalf of the other members, however, the personal judgement of household or their wife could have been weighed in. For example, it is possible that they might have chosen the community facilities that accommodate the activities that they want other family members to do, rather than what those other members actually prefer.

Ⅶ. Discussion

Apartment complexes are the most common type of housing in Seoul, Korea. If well designed and planned, apartment complexes can have a positive influence on the social life of the residences by encouraging interaction among families and inducing a sense of community and neighborhood cohesion (French *et al.*, 2014; Joseph *et al.,* 2015). In addition, as the recreational quality of living environments has become increasingly important, apartment complexes could satisfy the demands of modern living by providing community facilities within them. Community facilities serve residents in the most local and convenient location, and often function as a ground for neighborhood social activities.

Although the Housing Construction Standards offer guidelines to developers to provide required community facilities, this regulation is not always followed. Some of the most preferred facilities are not provided in apartment complexes. Developers should fulfill the given regulatory requirements with rigor. Moreover, the Housing Construction Standards should be revised to reflect the changing needs and preferences of residents, requiring developers to survey preferences for community facility types for potential residents, or to investigate established apartment complexes of similar types to discover trends and best practices from their peers. This extra process may increase the initial construction cost, but would ultimately help the project be more highly valued.

References

1. Bang, S. H.(2014) Scarcity of child care centers in Naegoek. News Tomato. Retrieved from http://www.newstomato.com/readNews.aspx?

no=507469.
2. Cho, S. H. and H. G. Kang(2001) A study on the shared space of multi-family housing for community design. Journal of the Korean Housing Association 12(4):10.
3. Choi, H. J.(2015) Expansion of child care center: The problem is finance…Can the "Model of Seoul" be an answer? The Hankyoreh. Retrieved from http://www.hani.co.kr/arti/society/rights/677585.html.
4. Choi, I. J.(2006) A study on the suitable supply of community and service facilities according to component ratio by size of floor space in apartment complexes. Journal of the Architectural Institute of Korea Planning and Design 22(4):159-168.
5. Choi, K. T. and J. H. Lee(2011) An analysis of the relation between supply criteria of public facilities and residents' satisfaction for community revitalization in apartments. Journal of the Korean Institute of Ecological Architecture and Environment 11(6):19-28.
6. Choi, K. S., S. H. Bae, M. S. Kang and S. R. Joo(2000) A study on the architectural design guidelines for child care centers. Architectural Institute of Korea 16(12):1-10.
7. French, S., L. Wood, S. A. Foster, B. Giles-Corti, L. Frank and V. Learnihan(2014) Sense of community and its association with the neighborhood built environment. Environment and Behavior 46(6): 677-697.
8. Hur, J. S.(2002) Determinants of leisure activities among urban elderly persons. Journal of the Korean Gerontological Society 22:227-247.
9. Hur, M. and H. Morrow-Jones(2008) Factors that influence residents' satisfaction with neighborhoods. Environment and Behavior 40(5): 619-635.
10. Joseph, A., Y. S. Choi, and X. Quan(2015) Impact of the physical environment of residential health, care, and support facilities(RHCSF) on staff and residents: a systematic review of the literature. Environment and Behavior, DOI: 10.1177/0013916515597027.
11. Ju, S. R., Y. S. Park, K. O. Park and S. S. Zchang(2002) Space programing of community centers in multi-family housing. Journal of The Korean Housing Association 13(3):33-43.
12. Jung, D. H. and T. W. Park(2012) Comparative study of related group preference for exterior space components of co-housing. Journal of The Korean Regional Development Association 24(4):149-167.
13. Kang, S. J. and B. B. Lee(2015) A study on the planning guidelines for revitalizing 'Kyungrodang' in apartment complexes through the analysis of demands and actual condition of operation. Journal of the Korean Housing Association 26(6):207-216.
14. Kim, J. and R. Kaplan(2004) Physical and psychological factors in sense of community: New urbanist Kentlands and nearby Orchard Village. Environment and Behavior 36(3):313-340.
15. Kim, J. H. and T. J. Kim(2014) Analysis of the importance of outdoor facilities in exterior spaces on apartment complexes, focused on the preferences of residents. Journal of Korea Real Estate Academy 58: 142-153.
16. Kim, Y. H., H. W. Kang, Y. M. Won and Y. S. Kim(2011) An analysis of pre-feasibility evaluation factors of activation for welfare facilities for residents in apartment buildings. Korean Journal of Construction Engineering and Management 12(6):160-167.
17. Kim, S. J. and S. J. Min(2008) Study on community facilities in residential complexes. Journal of Korea Institute of Ecological Architecture and Environment 8(2):277-286.
18. Kim, D. H., D. S. Kim, J. H. Sin and S. B. Kim(2005) The change of outdoor space in apartment complexes and its causes. Journal of the Korean Institute of Landscape Architecture 32(6):52-67.
19. Kim, N. H. and Y. S. Hwang(2016) The effects of teaching methods on the adjustment of children to nursery schools. The Korean Society for the Study of Teacher Education 33(1):359-378.
20. Kim, S. Y. and C. O. Oh(2013) Evaluation and needs of the elderly for spatial characteristics of senior centers in apartment complex. Korean Institute of Interior Design Journal 22(5):33-41.
21. Kwon, T. H. and S. H. Choi(2009) A study on attitudes: Survey of apartment residents and superintendents for activating multi-family housing community facilities, focusing on apartment complexes under the control of a contract agent. Journal of the Architectural Institute of Korea Planning and Design 25(11):69-78.
22. McMillan, D. W. and D. M. Chavis(1986) Sense of community: A definition and theory. Journal of Community Psychology 14(1):6-23.
23. Oh, E. G., Y. S. Jang, S. L. Gong, and Y. J. Lee(2015) Development of agenda priority for nursing service research and development. Journal of Korean Academy of Nursing Administration, 21(1):99-110.
24. Paik, H. S., Y. H. Lee and H. S. Kwon(2015) The analysis of the total area method implementation in community facilities planning in apartment complexes. Journal of the Architectural Institute of Korea Planning and Design 31(3):33-40.
25. Park, S. H. and W. G. Lee(2009) A study on actual condition analysis of open space in residential complexes. Journal of the Korean Association for Local Government Studies 24(2):163-185.
26. Population and Housing Census(2014) Statistics Korea.
27. Regulations on the Housing Construction Standard Article(2015) Korean Ministry of Legislation.
28. Saaty, T. L.(1990) How to make a decision: The analytic hierarchy process. European Journal of Operational Research 48(1):9-26.
29. Saaty, T. L.(2004) Decision making: The analytic hierarchy and network processes(AHP/ANP) Journal of Systems Science and Systems Engineering 13(1):1-35.
30. Shin, H. K., I. S. Jo, Y. J. Kim and S. J. Lee(2011) A study on residents' needs and uses of community facilities in apartment housing complexes. Journal of the Korean Housing Association 1:251-255.
31. Shin, H. K., Y. J. Kim, S. J. Lee and I. S. Jo(2012) A study for community vitalization strategies through the revision of the Housing Construction Standards for community facilities in apartment housing complexes from the perspective of professionals. Journal of Korean Home Management Association 30(1):29-40.
32. Shin, Y. S., T. G. Yon, and Y. S. Lee(2006) A study on residents' cognition and behavior about communal space in apartment housing. Journal of the Institute of Interior Design, 15(1), 166-174.
33. Song, M. G.(2009) A study on the use of and demand for community facilities according to the types of apartment complexes: A case study of the Young-In Dong-Baek area. Journal of the Korean Real Estate Analysts Association 15(2):167-183.
34. Song, J. J. and I. S. Um(2008) The relationship between leisure types and depression and loneliness in the middle-aged and the elderly. Korean Academic Society of Tourism Management 23(1):43-62.
35. Wind, Y. and T. L. Saaty(1980) Marketing applications of the analytic hierarchy process. Management Science 26(7):641-658.

Received : 26 September, 2017
Revised : 03 November, 2017 (1st)
12 December, 2017 (2nd)
Accepted : 12 December, 2017
3인익명 심사필

Appendix 1. Study sites

Apt. name	Address	Year/ month built	Number of household	Average growth area per unit(m^2)	Average net area per unit(m^2)
A. Hanjintown	346, Haengdang-dong, Seongdong-gu, Seoul, Korea	2000. 11	2,123	110.53	84.02
B. Hongjae Hillstate	459, Hongje-dong, Seodaemun-gu, Seoul, Korea	2000. 06	939	109.45	85.96
C. Hyundae Hometown	711-2, Doksan 1-dong, Geumcheon-gu, Seoul, Korea	2002. 09	996	93.88	71.97
D. Jeonnong SK	10, Jeonnong 2-dong, Dongdaemun-gu, Seoul, Korea	2000. 07	1,830	109.96	85.54
E. Lake Palace	44, Jamsil 3-dong, Songpa-gu, Seoul, Korea	2006. 12	2,678	125.44	96.45
F. Raemian Firstage	18-1, Banpo 2-dong, Seocho-gu, Seoul, Korea	2009. 07	2,444	153.02	120.21
G. Samsung Hilstate	16-2, Samseong 2-dong, Gangnam-gu, Seoul, Korea	2009. 12	1,144	100.52	76.93
H. Sinjeong I-Park	1296, Sinjeong 2-dong, Yangcheon-gu, Seoul, Korea	2002. 07	590	116.11	92.42
I. SK Bukhansan City	1353, Samgaksan-dong, Gangbuk-gu, Seoul, Korea	2001. 12	3,830	108.39	83.72
J. Wolgye Grandvill	18, Wolgye 3-dong, Nowon-gu, Seoul, Korea	2002. 10	3,003	115.49	89.83

Appendix 2.

◆ Importance of community facilities in apartment complexes ◆

I. Notes for the survey

- Please check (✓) which indoor community facilities are in your apartment complex.
  ○ senior citizen center ○ child care center ○ indoor sports facility ○ small library
- Please check (✓) which outdoor community facilities are in your apartment complex.
  ○ garden in senior citizen center ○ playground ○ outdoor sports facility

II. Evaluation of community facilities

Please check (✓)on community facilities that you prefer.

1. Which do you think are more important, outdoor facilities or indoor facilities? You can make a check even if these specific community facilities do not exist in your apartment complex.

Community facility (outdoor community facilities, indoor community facilities)																		
	Extreme importance		Very strong importance		Essential or strong importance		Moderate importance of one over another		Equal importance		Moderate importance of one over another		Essential or strong importance		Very strong importance		Extreme importance	
Outdoor community facilities	⑨	⑧	⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Indoor community facilities

2. Which do you think are more important among indoor community facilities? You can make a check even if these specific community facilities do not exist in your apartment complex.

Indoor community facilities																		
	Extreme importance		Very strong importance		Essential or strong importance		Moderate importance of one over another		Equal importance		Moderate importance of one over another		Essential or strong importance		Very strong importance		Extreme importance	
Senior citizen center	⑨	⑧	⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Child care center
Senior citizen center	⑨	⑧	⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Indoor sports facility
Senior citizen center	⑨	⑧	⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Small library
Child care center	⑨	⑧	⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Indoor sports facility
Child care center	⑨	⑧	⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Small library
Small library	⑨	⑧	⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Indoor sports facility

3. Which do you think are more important among outdoor community facilities? You can make a check even if these specific community facilities do not exist in your apartment complex.

Outdoor community facilities																		
	Extreme importance		Very strong importance		Essential or strong importance		Moderate importance of one over another		Equal importance		Moderate importance of one over another		Essential or strong importance		Very strong importance		Extreme importance	
Garden in senior citizen center	⑨	⑧	✓⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Playground
Garden in senior citizen center	⑨	⑧	⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Outdoor sports facility
Playground	⑨	⑧	⑦	⑥	⑤	④	③	②	①	②	③	④	⑤	⑥	⑦	⑧	⑨	Outdoor sports facility

4. What is your gender?
① Male ② Female

5. How old are you?
① 20s ② 30s ③ 40s ④ 50s ⑤ 60s+

6. How long have you lived in your current place?
① ~5 years ② 5~10 years ③ 10~20 years ④ 20+ years

7. What is your family composition?
Husband or wife:
Kids:
Parents:

8. How big is your place?
① up to 33 m^2 ② up to 66 m^2 ③ up to 99 m^2 ④ up to 132 m^2 ⑤ up to 165 m^2 ⑥ up to 198 m^2

9. What is your annual income? (Unit: won; KRW)
① 20,000,000 ② 30,000,000 ③ 40,000,000 ④ 50,000,000 ⑤ 60,000,000+

10. Please write down any community facilities that you wish to use.