

Case study on sustainable design for community spaces in Apartment complexes

-Focused on the Environment-Friendly Certified apartment-

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ABSTRACT: The purpose of this study is to identify the planning features of residential complexes that are people-friendly, nature-friendly and ones that improve the quality of the complex through sustainable design elements found in the apartment community space. Eight environment-friendly apartment complexes in the Seoul metropolitan area were researched for case studies.

Sustainable design was categorized into three areas a) social sustainability b) economic sustainability c) ecological sustainability. The result of this research is as follows. First, there were variations in the application of sustainable design among the apartment complexes. Apartment complexes with relatively small number of households, consisting of 20~40 pyung (approximately 60.3~120.3m²) size apartments showed low levels of application. Second, when sustainable design was categorized into three areas social, economic, and ecological sustainability, social sustainability was applied the most while economic sustainability was applied the least to the design. These appeared as different forms of community space, design with space connectivity, utilizing the space beneath the piloti for playing and relaxing. Third, characteristics of sustainable design were more apparent in area planning than facilities planning. Space planning elements such as pedestrian road, barrier free design, promenades within the complex, water space etc were planned in various forms in connection with the other spaces. However, facilities planning elements such as using recyclable material, recycling rain water and ground water and alternative energy facilities showed low levels of sustainable design application.

Keywords: Sustainable Design, Community space, Social, Economic, Ecological

1. INTRODUCTION

High-density development through high-rise apartment buildings has caused Korea's representative form of living arrangements, apartments, to bring uniformity and dehumanization in architecture. The community space within the residential complexes, have not properly reflected the

living characteristics and consciousness of the people living there. More attention was paid to securing more space and ensuring the efficiency of the layout according to legal standards. Apartments did not even provide the residents with an opportunity to enhance community spirit through increased exchanges with neighbors.

However, with improvement in the quality of life, reduction in labor hour and resulting increase in leisure time, the importance of community space within residential complexes to enhance the quality of life and create more pleasant spaces is increasing.

The purpose of this study is to identify the planning features of residential complexes that are people-friendly, nature-friendly and ones that improve the quality of the complex through sustainable design elements found in the apartment community space. We plan to use the results of this study as base material for designing and planning community spaces in common housings in the future.

2. METHODS

The research method for this study was conducted by studying case studies and various documents through preceding research. The preceding research consisted of researching the brochures, catalogues and website of each apartment. The case studies describe the present conditions of the apartments which were studied through on-site investigations. The subject for this study was eight environment-friendly apartments constructed in the Seoul metropolitan area from 2006 to January of 2008. Case study research was carried out on-site from April 8th, 2008 to May 23rd, 2008.

Within the scope of residential environment, sustainable design can be categorized into three areas¹ a) social sustainability b) economic sustainability c) ecological sustainability.

Socially sustainable design must ensure social development through social integration, social harmony, and historical

and cultural sustainability. Economically sustainable design must create an environment for improving and maintaining the economy, with energy and resource conservation in mind. As an effort to preserve and improve the environment, ecologically sustainable design must create an environment from a land-use and ecological standpoint.

This study analyzed and created a check-list for the preceding study, according to the design principles of social, economic, and ecological sustainability.

Table I: Checklist of sustainable design factors

objective	contents
Socially Sustainable Design	Maximum of open space
	Planning of community space
	Creating space for pedestrians
	Utilization of Piloti Space
	Design with connected to the community space
	Barrier free Design
	Establish various community facilities
	Install art works within complex
Economically Sustainable Design	Accessibility to public transportation
	Establish bike road within complex
	Establish bike storage within complex
	Use recyclable material
	Space planning for waste recycle
	Recycling of rain and ground water
	Install alternative energy facility
Ecologically Sustainable Design	Connectivity and accessibility of green space
	Connectivity and accessibility to water space
	Creation of promenade within complex
	Area for learning about nature
	Planning for green man-made environment
	Creation of water-friendly environment (streamlet, fountain)
	Biotope-Habitat area for living organisms
	environmentally-friendly parking space

¹ Wikipedia's definition of sustainable design is as follows. "Sustainable design (also referred to as "green design" "eco-design", or "design for environment") is the art of designing physical objects and the built environment to comply with the principles of economic, social, and ecological sustainability."

3. RESULTS AND DISCUSSION

3.1 The general characteristics of apartments

Subject for the study was eight environment-friendly certified apartments located within the Seoul Gyeonggi province areas built after 2006. Number of households within the complexes varied from 273 household units to 1360 household units. F and G apartments had less than 500 household units and comprised of apartments in the 20 pyung range (approx. 60.3 m²). A, C, and H apartments had below 1000 household units. B, D and F apartments had over 1000 household and comprised of different size apartments ranging from 20 pyung to 60 pyung (approx. 60.3 m² ~ 180.3 m²). Apartment complexes with over 700 household units with apartment sizes in the 50~60 pyung (approx. 150.5 m² ~ 180.3 m²) had a central square. With the exception of some tower-shaped buildings, most of the apartment buildings in complex D, H and E were shaped like a rectangle.

3.2 Characteristics of sustainable design

(1) Socially sustainable design

Socially sustainable design was found to include a pedestrian-only road to enhance the safety of the pedestrian while connecting it to the playing and resting space. The piloti space below the main building provides either a space for playing or resting, so that there is increased interaction with neighbors. Bumps were eliminated for the elderly and the physically-challenged in resting areas, playing areas, pedestrian spaces and community spaces within the complex. With the exception of one case, the complexes installed various forms of art work. Only when the parking space was located underground, was the open space planned into parks and green space with various themes.

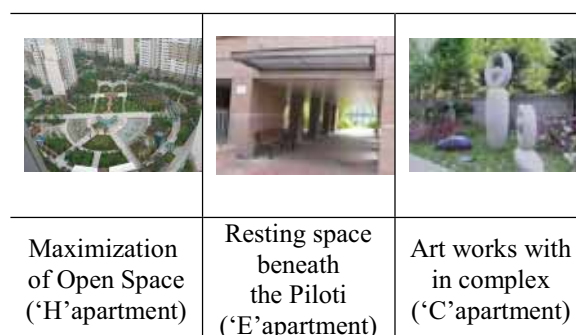


Figure 1: Socially sustainable design features

(2) Economically sustainable design

Economically sustainable design was found in the form of bike storages or accessibility to public transportation as means to increase accessibility to outside space from the complex. Compare to other items on the evaluation checklist, usage of recyclable material, recycling of rain and ground water, alternative energy facilities such as solar energy ranked the lowest in terms of sustainable design application.

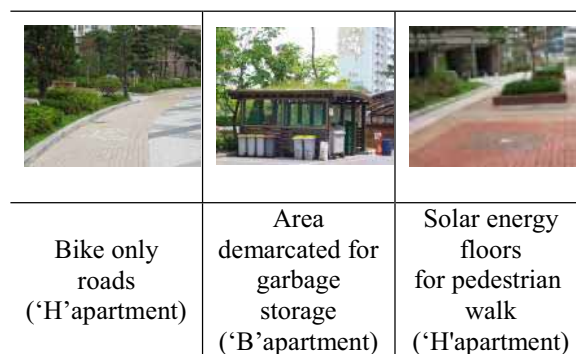


Figure 2: Economically sustainable design features

(3) Ecologically sustainable design

Ecologically sustainable design was found in the form of green spaces within the complex which includes environment-friendly promenade, water space such as streamlets and fountains, green plants covering the fences located on the outskirts of the complex and the walls of the main buildings. There were case studies where an environment-friendly green parking lot for the physically-challenged (on the ground

level) was created by utilizing the surface of the parking space. There were other case studies where ecological sustainability was demonstrated by creating a space to learn about nature within the complex. These case studies accounted for about half of the cases researched and showed low levels of sustainability when compared to other items on the checklist.

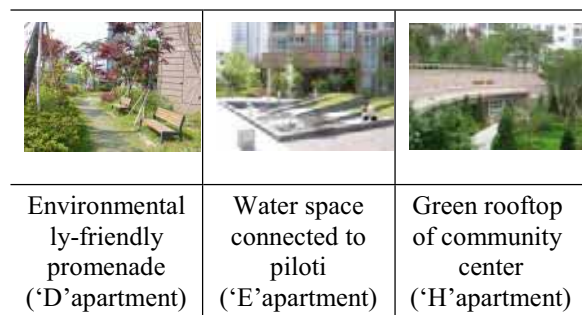


Figure 3: Ecologically sustainable design features

3.3 Design characteristics of each sustainable design planning elements

Sustainable design elements were categorized into socially, economically and ecologically sustainable design. Of the three elements, socially sustainable design showed highest levels of application recording 84.38% while economically sustainable design was not applied to 42.86% of the surveyed apartments.

Table II: Characteristics of sustainable design factors

Objective	Contents	%
Socially Sustainable Design	Maximum of open space	37.5
	Planning of community space	100
	Creating space for pedestrians	100
	Utilization of piloti space	87.5
	Design with connected to the community space	87.5
	Barrier free design	100
	Establish various community facilities	75.0
	Install art works within complex	87.5

Economically Sustainable Design	Accessibility to public transportation	100
	Establish bike road within complex	37.5
	Establish bike storage within complex	100
	Use recyclable material	37.5
	Space planning for waste recycle	50
	Recycling of rain and ground water	50
	Install alternative energy facility	25
Ecologically Sustainable Design	Connectivity and accessibility of green space	87.5
	Connectivity and accessibility to water space	62.5
	Creation of promenade within complex	100
	Area for learning about nature	50
	Planning for green man-made environment	87.5
	Creation of water-friendly environment (streamlet, fountain)	100
	Biotope-Habitat area for living organisms	62.5
	environmentally-friendly parking space	50

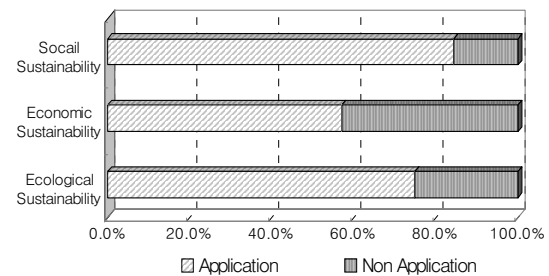


Figure 4: Characteristics of the objects

4. CONCLUSION

This study surveyed the cases studies of environmentally-friendly apartments in order to identify the planning characteristics by analyzing the sustainable design planning methods applied to community spaces. The founding of this study is as follows.

First, there were variations among the different complexes with regard to the application of sustainable design features.

Apartment sizes ranging between 20~40 pyung (approx $60.3 \text{ m}^2 \sim 120.3 \text{ m}^2$) showed lower levels of application.

Second, when sustainable design was grouped into three categories social, economic, ecological sustainability, socially-sustainable design showed the highest application while economically sustainable design showed the lowest level of application. Various forms of community space, design that promotes connectivity between spaces, resting and playing area in the space below the piloti was found.

Third, characteristics of sustainable design were more apparent in area planning than facilities planning. Space planning elements such as pedestrian road, barrier free design, promenades within the complex, water space etc were planned in various forms in connection with the other spaces. However, facilities planning elements such as using recyclable material, recycling rain water and ground water and alternative energy facilities showed low levels of sustainable design application.

The next step in research is to investigate the needs and requirements of the residents through surveys and interviews, in order to promote the sustainable development of the residential space.

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