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Redesign of Street Space According to the User Groups' Cognition Characteristics in the Detached Housing Area

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ABSTRACT

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REDESIGN OF STREET SPACE ACCORDING TO THE USER GROUPS' COGNITION CHARACTERISTICS IN THE DETACHED HOUSING AREA

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Abstract

The objective of this study is to identify the difference between the physical shapes of streets and building usage in Korea's new towns, depending on zone and sphere, thereby deriving characteristics related to perception of the street environment based on the assessment by user groups. This study investigates alternatives to mitigate such differences through a redesign of the street space. The targeted areas are both inside and outside of station influence areas within two new towns. This study conducted a questionnaire survey and an interview survey. To analyze the data, ANOVA analysis, IPA analysis, and AHP analysis were conducted. Through the data analysis, interviews, and redesign of street space applying implications from interview, in the future, a development shall be divided into a "shopping priority zone" and "residence priority zone". When urban design policies are directed toward planning smaller unit sectors, and setting design guidelines in detail, it will be more positive in the satisfaction level.

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1. Introduction

Recently, the type of housing in Korea has changed from high-rise apartments to low-rise detached houses, multiple houses, and detached housing which also function as shops. However, most of studies on urban environmental problems associated with the life quality of urban people are still focusing on large - scale apartment complexes and commercial areas. On the other hand, there are relatively few studies on urban street environment crowded with small - scale buildings in residential areas despite their harsh environment.

In particular, the residents who live in the detached housing area in new town have complained about the deterioration of the sunshine environment, traffic and parking problems, pedestrian safety problems, indiscriminate mix of residential and commercial functions, monolithic architectural forms, and monotonous street scenes.

Detached housing houses in type-1 general residential area have the same problems of buildings in commercial areas due to the combinational functions of shop and house.

In particular, due to the mix of commercial functions in the form of low - rise residential complexes, user groups that can be classified into residents, shop operators, and visitors will meet or conflict with interests according to the usage purpose of the detached housing area among the groups.

Understanding and applying the users' needs for street environment in urban design is the basis and goal of the design. In addition, since there is a difference in the street environment between the station influence areas and the non-station influence areas of existing city, it is necessary to grasp the current situation and to induce or suppress the change in accordance with the public interest.

Therefore, it is urgent to make the street environment assessment and to investigate the important factors of the street environment between user groups due to the mixture of residential and commercial functions in the detached housing area.

The purpose of this study is to identify the differences in the physical form of street space and architectural use in the detached

housing areas of new towns, and to identify the characteristics of street environment recognition among user groups. Also ways are sought to resolve the differences in evaluation.

2. Literature Review

Prior studies related to the Detached Housing Area of New Town include the use of low-level areas of Detached Housing Area, street environment, external space, parking environment, improvement of District Unit Plan, research on housing satisfaction, and can be divided into research related to housing satisfaction, shopping mall related research, and urban design related research.

Additionally, the area of the preceding research related to the street environment can be divided into the street environment of the residential area, the street environment of the commercial area, and the street environment evaluation system.

In the preceding studies of street environment in low-rise residential area, the study on walking environment, physical environment factor and walking satisfaction (Sohyeon Park, et al., 2009[1]; Kyuri Kim., 2014[2]), walking path distribution and walking behavior analysis distribution and gait behavior analysis (Hanlim Seo., 2013[3]) are included.

Regarding the commercial environment, there are preceding studies on the physical environment of the street and the street activation and satisfaction according to the commercial sector (Jooah Lee, 2014[4]; Yeonkyung et al., 2009[5]; Youho Won, 2015[6]), and A Study on the Effect of Physical Characteristics and Walking Amount of Landscape (Kihun Kim et al., 2014[7]; Jeongwoo Lee et al., 2015[8]).

There are also preceding studies on the system and problems of district unit plan in new town (Dongwook Sohn, et al., 2014[9]; Youngin Kim, et al., 2009[10]; Sunghak Jo, 2007[11]) and studies on the commercial business types of Detached Housing Area (Jaehyen Kim. et al., 2008[12]; Jina Park, et al., 2013[13]).

3. Research Methods

The survey sites were Ilsan New Town and Samsung New Town, and each city was classified again into station and non - station influence areas. The contents of this study are 'new town', 'urban design and district unit plan', 'detached housing house', 'street environment characteristics', 'street environment of detached housing area.' As research methods, a closed questionnaire on the street environment was used to conduct the case survey and interview survey with user groups. An interview survey with experts was also carried out. Amenity, convenience, safety, and territoriality were set as the street environment measurement factors for evaluating the street environment and 26 elements were derived as the measurement elements.

The survey data were analyzed by ANOVA, IPA grid analysis, and AHP analysis. The user groups' interview survey data was used to identify the cause of satisfaction through the frequency analysis of the referred factors. The expert group's F.G.I survey data was used to analyze the interpretation results and to draw out the implications and the improvement methods for the system through the qualitative analysis.

4. Analysis & Results

4.1 Survey Analysis

The differences between the overall satisfaction and satisfaction with the components were analyzed. The sphere differences in amenity and safety were significant, and the satisfaction in amenity and safety was higher in Samsung New Town. With regards to the differences among the user groups and between the spheres, the differences in amenity, safety, and territoriality were significant among the user groups in Ilsan New Town. The differences in convenience and safety were significant between the spheres. Also, the differences in convenience and territoriality were significant among the user groups and spheres in Samsung New Town.

The correlations among the overall satisfaction and satisfaction with each

component were analyzed, and amenity, convenience, safety, and territoriality were significantly correlated. As a result of the multiple regression analysis on the factors affecting the overall satisfaction, amenity, territoriality, and convenience were analyzed to have significant effect in a descending order.

An IPA grid analysis was performed on the relationship between the importance and satisfaction with each factor of the street environment, and the cognition characteristics of each group and sphere were distinct from each other. All AHP analyses for each user group, sphere and district identified safety as the highest ranked factor, and territoriality as the lowest ranked factor. Safety was highly ranked presumably as a characteristic of the areas for business and detached houses.

4.2 Interview Results

In the station influence areas in Ilsan New Town, all users were not satisfied with the mixture between residence and businesses and business types. But they felt safe on the revitalized streets with a rise in the pedestrian volume brought by the businesses in low-levels.

The building exteriors and number of levels were satisfactory in all areas in Samsong New Town. The house residents were satisfied with the parking facilities, but the shop operators and visitors were not.

The width and maintenance status of the sidewalks, safe speed of the automobiles, and landscaping facilities were not satisfactory in Ilsan New Town and Samsong New Town. In particular, the illegal parking status, street noise, and illumination of the street lights were highly unsatisfactory in both cities.

The findings of the interviews with the expert groups show similar opinions, regardless of the field. They suggested that “safety enhancement through building a closed environment is meaningless, and it is more effective to ensure safety in individual buildings, businesses and houses, than in the entire locality.”

Second, the experts commented that for street revitalization, they argued that “the design factors for the street environment (geometric line forms of the road, street lights, street trees, terraces, signboards, local history, etc.) shall be provided in detail to distinguish the street environment for each block.”

Third, for improvement, they suggested that “the spheres where commercialization is difficult needs an increase in the number of households more than businesses in the first floors, and for the spheres where more commerce is needed than residence, such demand needs to be applied in the district unit plan” while “the applications shall be more flexible than the current rigid system in order to enable the composition of use type based on the choice of the market and landlord.” Also, “building a buffer zone between the housing area and business concentrated area by differentiating the allowed use types” can be another way.

Fourth, the dissatisfaction with convenience and safety, particularly with the parking spaces and illegal parking, “it is the result of the mixture between the walking route and vehicle route due to narrow sidewalks, and causes problems in parking, noises, landscape, and pedestrian safety. The density of the vehicle transit shall be reduced through the installation of common parking lots.” “Efficient parking lot installations are needed, such as small-sized dispersed parking lots in the areas for businesses and detached houses, and overlapping parking lots for parks and green spaces, instead of a large off-street parking lots in the commercial area” For improvement, they suggested to “build more common parking lots at the stages of district unit planning and preparation of housing area, and initiate a compulsory land donation system as part of the current housing area development and urban development projects.”

Fifth, with regards to territoriality, they commented that “the height, external wall materials, and colors are important and satisfactory for all of the residents,

merchants, and visitors in Samsong. However, a different result was observed in Ilsan. In other words, the planning and architecture of Samsong seemed to have reflected the research findings and plans with which territoriality could be recognized.” On territoriality, “rather than the current district unit planning, detailed regulations on specific exterior and colors will encourage unique and thematic architecture for some districts for the satisfaction of consumers and residents.”

4.3 Redesign of Street Space

This study redesigned the street environment shown in <Table 1> with the applications of the implications from the interviews with the user groups and expert groups.

In accordance with the interview findings, a set of applicable components were selected for the redesign, and the revised working guidelines for lot development and provisions in the current legislations were reviewed. Subsequently, the street space redesign components were selected, and three building unit types were designated to form the spaces in the roads and lots for street space design. Next, these components and unit types were synthesized to redesign the street space.

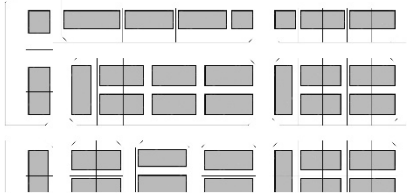
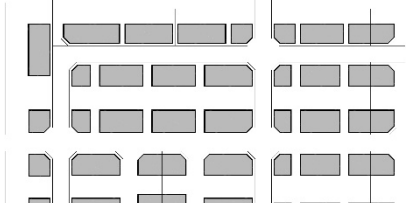
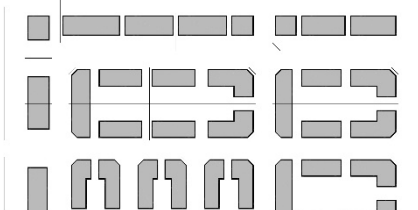
Of the three synthesized patterns, the first front space type was applied to the comparatively wider roadsides in the areas that are adjacent to train stations, that have more pedestrian traffic, and that in need of street revitalization. Consequently, the vehicular access from the road became more convenient, and the front space and sidewalk width were widened. Also, all outdoor activities were concentrated in the wide roadsides for better convenience and safety.

The rear space type was applied to the roadsides with low pedestrian volumes that need quietness. The commercial space and outdoor shops were located independently in the rear for a stronger definition territoriality and pedestrian safety from the road.

The courtyard type was applied to the lots within the blocks that need protection of residential environment. Amenity and convenience have been improved by the combined arrangement of parking lots and landscape, and the boundary was drawn against the commercial district. The sole arrangement of residence strengthened the definition of territoriality.

The number of discontinuing sidewalks was largely reduced by the building agreement and the double wall structure between the buildings, and the front length of the buildings were increased, resulting in better amenity and convenience for pedestrians. Also, the public parking lots were distributed in the commercial areas to fulfill the parking demands of visitors.

Table 1. Combination of Redesign Factors and Basic Unit Types

Div	Layout
Front space type	
Rear space type	
Courtyard type	

5. Discussion & Conclusion

In Ilsan new town, the satisfaction on all factors of street environment was higher in station influence area than in non-station influence area. In the station influence area with many shops, the activation of street due to shopping sections was surveyed to increase the pedestrian volume and help to

improve the safety which has the highest importance.

The reason why the satisfaction of shop operators was lower than that of residents or visitors seems to be because the physical street environment of shopping section such as parking spaces was poor in the station influence area and the supply of shops in the non-station influence area was too large when relative to its commercial volume. And, in the business type of shops, the importance level was very high but the satisfaction was low in all the user groups. It is necessary to regulate or induce the shop types according to the location of the station and non-station influence areas so as to secure the territoriality and the sphere characteristics.

In the element of 'the exterior design of building' of the amenity factor and in the elements of 'the height of building,' 'the exterior wall material of building', and 'color' of the territoriality, their importance and satisfaction levels turned out to be higher in Samsung New Town than in Ilsan. It may be because the age of buildings is not so long, but it can also be because the district unit plan of Samsung New Town is more specific and concrete than that of Ilsan, as shown in the survey.

Therefore, in the future urban design, it seems more positive for the street environment satisfaction level to subdivide the target district into smaller units and suggest specific design guidelines in regulating or inducing rather than to design it as a unit of district.

Finally, the lack of parking space and the illegal parking were the factors to increase the dissatisfaction on the street environment in detached house area, as mentioned in the precedent studies. As the current block supplying price system based on the composition cost and the appraisal price is generating too much profit to the block suppliers, it can be a good method to install the public parking lot in the areas with high installation demands such as station influence area and to include the expenses to the development cost.

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