A Study of Living Village Characteristics Through Types of Residential Areas and Resident Cognitive Tests in Seoul, Korea

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Abstract
This study suggests a participatory living village recognized by residents, and examines the characteristics of such a village for the purpose of the effective execution of a living zone plan. The living zone plan is based on a spatial unit, and is categorized as being in the intermediate stage between an urban master plan and an urban management plan. As an administrative division, the present minimum unit of a living zone was designated based on the population and managerial efficiency of the zone; this causes many difficulties in understanding residencies and residents. In this regard, in this study, tests are conducted on residents' village recognition in consideration of different physical types of residential areas, with the aim of generating the boundary, scale, and area characteristics of a recognized village before suggesting the designation of a living village.

Keywords: living zone; living village; living village characteristics; types of residential area; resident cognitive test

1. Introduction
1.1 Background and Aim of the Research
Since modern times, cities have experienced spatial expansion following exponential population growth and urban development projects. Today, a more stabilized population and economy has encouraged citizens to demand an affluent life with ready access to culture and leisure activities. Urban policy has been focused on diversified attempts to realize the maintenance, management, regeneration, and creation of community as well as urban development. Of these attempts, the living zone plan, the aim of which was to spatially divide a city and establish a short-and-long-term plan, is considered a useful means of urban planning. Recently in South Korea, the Ministry of Land's domestic urban planning system has made it possible to establish a 'Living Zone Plan' in the intermediate stage between the urban master plan of the existing comprehensive superior plan and the subordinate urban management plan (Ministry of Land, 2014).

The Living Zone Plan is a spatial plan intended for daily life that reflects the regional characteristics and residents of local communities. It can be connected to various sectors for the purpose of suggesting a future vision for certain areas and the direction of their development. Seoul Metropolitan City (Seoul City) established, for the first time in Korea, a local Living Zone Plan by using and monitoring a residents-participatory panel. While a gap was revealed between resident' recognition of the uniform plan and the residential life environment due to the limited spatial recognition by residents, positive aspects of participation by residents were also shown. A small living zone, the present residential life unit, is defined based on an administrative division for the purpose of convenient management. In Seoul, the median value of one administrative division is based on about 0.98 km² (2012), whereas that of a village-unit project in Seoul is about 0.037 km² (2011~2015, 54 projects), which indicates a significant difference.

In the U.K., where urbanization was initiated earlier, than in South Korea, Regional Development Agencies, a policy-wise support space unit, was transformed into Local Enterprise Partnerships (LEP), concentrating on the small-scale local cooperation systems, with the inauguration of Cameron's administration in 2010. LEP is a living zone plan with less binding power than the traditional parish (the minimum administrative district unit in the U.K.), and it is subject to the everyday life spaces used by residents.

Accordingly, this study focused on common places used by residents, in accordance with the intention of a living zone. Toward this end, the aim of the study is to define and characterize a location-centered 'living village', considering the physical characteristics of a local community and humanistic characteristics of
residents while attempting to facilitate village unit planning and related projects.

1.2 Methodology

This study was motivated by the demand for a living village compatible with village-unit projects in the hierarchy of living zone. Policy and projects aimed at the maintenance, management and regeneration of a residential area start with understanding about spatial scope where residents discuss issues. However, the minimum unit of the living area hierarchy is based on an administrative division for the purpose of managerial convenience, and the subject site of a village project is determined according to a planner. This process is necessary because urban tissue varies depending on residences, and the scale of a perceived village is diversified according to the behavioral patterns of residents. Accordingly, this study focuses on examining the characteristics of a living village and effectively designates the living village. Toward this end, a resident cognitive test was implemented based on the assumption that ‘village characteristics recognized by residents vary depending on types of residential area,’ and verification was conducted. For the purpose of experimental research, the spatial scope was confined to areas of Seoul that represent domestic urban residences and where living zone plans and village-unit projects are proactively conducted. The research process is as follows.

1. Residents’ everyday life space is re-established as a living village in the living zone hierarchy.
2. Types of residential area are designated in consideration of the urban tissue of the residential area.
3. Living village characteristics are identified and characterized by types of residential area through a resident cognitive test.
4. The living village is used in a living village plan and related projects in consideration of the characteristics of a living village.

2. Living Village

The concept of a ‘living zone’ was first coined by E. Howard in the proposal of a Garden City (1889) to improve residential environments in the wake of the rapid urbanization of the Industrial Revolution at the end of the 19th century. In the 1920s, the Radburn Plan was announced to develop large-scale residences following the speedy distribution of cars in the U.S. After C.A. Perry’s theory of the ‘neighborhood unit’ based on a commuting scale was recognized in 1929, it was accepted and became popularized as a residence planning method. Following this, urbanization accelerated on the strength of the economic and cultural benefits offered by a city. However, this rapid urbanization eventually led to urban social problems. Various attempts were made around the world to address these problems. In the 1980s, the concept of the ‘living zone’ became known as ‘Urban Village’ in the U.K. and ‘New Urbanism’ in the U.S., where the characteristics of traditional small cities, communities, and pedestrian-friendly residence plans were applied. In the case of Portland, Oregon in the U.S., the urban planning system included a ‘Comprehensive Plan’, a legal plan, a ‘Community Plan’, and a ‘Neighborhood Plan’, as well as non-legal plans. The urban master plan included Portland City (the entire population). Meanwhile, the community plan consisted of 8 living zones (about 70,000 people), and the neighborhood district plan comprised 108 living zones (about 5,000 people). Based on this spatial system, the subordinate community plan and the neighborhood district plan constitute the superior Comprehensive Plan Map and its mutually complementary system. Eventually, the living zone divided the city according to the spatial scale, and was advanced as a means of resolving social problems caused by urbanization based on neighborhood units.

The concept of a domestic living zone is defined in urban master plans and research literature as an area providing spatial scope for the everyday lives of residents in a specific area. In South Korea, the concept of a living zone first appeared in an urban master plan with the Seoul Plan in 1978. However, it has only recently been utilized. Based on the National Land Planning and Utilization Act, domestic urban plans are divided into (i) urban master plans and (ii) urban management plans that have higher and lower systems. The Urban Master Plan Acts as a guideline for the Urban Management Plan, and is a comprehensive 20-year plan that suggests the basic spatial structure in pertinent urban districts and the direction of long-term development. An Urban Management Plan is a lot-based concrete plan with a binding power for the purpose of sound and continuous development of the various functions of pertinent districts and residents’ lives. While an urban master plan and a management plan can work effectively in a small-and-medium-sized city with a small population, their effects vary in large cities such as Seoul due to the diversity of spatial scope. Accordingly, middle-road urban planning was requested that considered the city planning hierarchy. The Ministry of Land revised their guidelines for the establishment of a framework plan for cities and rural areas in October 2014 at the recommendation of Seoul City, so that the ‘Living Zone Plan’ could be made in accordance with the urban conditions.

As a subsequent plan to the ‘2030 Seoul Plan,’ Seoul City established a ‘living zone plan’ and designated 5 large-scale living zones, 116 medium-scale living zones, and small-scale living zones based on the required administrative division if necessary. Seoul City had previously established a district living zone plan, this was the first time a plan was implemented through residents’ participation in medium-scale or small-scale living zones. For this reason, the Seoul Institute monitored the resident’s participation workshop of a living zone plan. The main issues identified can be summarized as the ambiguity of
residential status and the roles of a living zone plan, the standardization of a living zone plan, and the ineffectiveness of the resident-participatory panel. These issues were due to resident's unfamiliarity with a living zone plan and failure in connection to everyday life space that the residents of a subject living zone can recognize in order to make suggestions. In reality, a resident-participatory panel thought that improvement of a workshop needs to concentrate on providing information (30.9%) that helps ascertain the current state of pertinent areas more than anything else while emphasizing the importance of the betterment of a residential environment (30%) and pedestrian environment (15%) in a living zone plan.

The minimum-unit living zones within an urban master plan include a small-scale living zone, a neighborhood unit and a basic settlement area, etc. However, the definition and designation standards vary depending on the local governments, and they are not specific. In Seoul City, the minimum-unit living zone is based on an administrative division in a living zone plan, and is based on the project costs in a resident participatory village project. However, an administrative division and the scope of a village project spatially differ. Therefore, the minimum-unit living zones and the location-based spatial unit recognized by residents are needed.

'A Living Village' is defined as a location-centered pedestrian living zone that reflects locality based on residents' everyday life. In addition, the residents should be able to select the area of the residential environment improvement project with a sense of bond and attachment, based on their cognitive experiences. Only when residents know the exact village can they plan the residential area from the bottom-up, and eventually solve the problems of their common place. As a result, a living village is an important means of a comprehensive living zone plan by resident participation. For this purpose, the living village should be reconstructed based on a specific living zone system ('metropolitan government district > large-scale living zone > local government district > medium-scale living zone > administrative district = small-scale living zone > living village') in order to prevent confusion about districts among the administrative management, the city plans, and the maintenance projects. Then, the local government should be able to proceed with village-unit plans and implementation based on a city plan rather than on a temporary maintenance project. The local government plan needs to be compatible with the sustainability pursued by a village project.

3. Types of Residential Areas

In domestic urban master plans, difficulties are experienced in designating boundaries and the scale of the minimum-unit living zone due to the differences among the physical, natural, humanistic, and administrative divisions. However, a range of methods has been attempted in various large cities to provide effective spatial planning; these methods have formative similarities according to the applied planning techniques. In particular, urban form is distinguished by such physical factors of the urban tissue as the streets, blocks, lots, and architectural structures. The characteristics of the urban tissue created in the process of domestic urbanization can be classified into types of residential areas based on their similarities.

The Urban Form study of Seoul (Seoul Institute) defines the urban characteristics of Seoul as follows. Historically, large organically connected streets were formed along natural topography and waterways, and smaller streets and lots developed to establish a traditional urban tissue. After modernization and the Korean War (1950), the grid street network and fixed-form lots were newly transplanted into the above-mentioned urban tissue in the old town of Seoul. The new town was developed into regular residential quarters featuring a systematic grid street network and rectangular blocks based on the western concept of the neighborhood unit. In addition, apartment complexes were created on adjacent sites by combining large city blocks. Subsequently, the redevelopment and reconstruction was carried out of both outdated residences and the old downtown centered on the hill areas with the development of individual apartment complex projects. These projects differed remarkably to those in the traditional urban tissue.

In the Urban Form Study of Seoul, the urbanization stages and the similarities in urban tissue were analyzed in order to divide the entire Seoul City into 7
spatial types. In response to this, this current study re-designated these 7 spatial types into the following 4 spatial types based on residential area.

Type 01) Spontaneous low-rise residence: Low-rise residence with street network created prior to urbanization

Type 02) Grid-type low-rise residence: Low-rise residence with land adjusted based on urbanization and grid-type street network

Type 03) Combination of low-rise houses and apartment complexes: Residence combining low-rise residences with apartment complexes

Type 04) Apartment district: Residence equipped with newly developed sites, street network, and apartment complexes.

4. Resident Cognitive Test

The aim of a resident cognitive test is to digitally generate the characteristics of a living village

Table 2. Types of Residential Area

| Type 1 | Type 2 | Type 3 | Type 4 |
|--------|--------|--------|--------|
| Formation | Spontaneousness | Planning | Mixing (type 1, 2) | Planning |
| Street | Irregular type | Grid type | Irregular and grid | Grid type |
| Block | Irregular form | Typical form | Mixing (type 1, 2) | Typical form |
| Lot/Complex | Inhomogeneous Lot | Homogeneous Lot | Mixing (type 1, 2 and 4) | Homogeneous Complex |
| Housing | Low-rise housing | Low-rise housing | Mixing (type 1, 2 and 4) | Apartment Complex |
| Population | Low | Low, Medium | Low, Medium | High |
| Land Use | 1st, 2nd general residential area | 1st, 2nd general residential area | 2nd, 3rd general residential area | 2nd, 3rd general residential area |
| Aero photo (samples) | | | | |

Table 3. Resident Cognitive Test Outline

| Classify | Explanation | Note |
|----------|-------------|------|
| Target | 200 random people in their 20s–40s living in Seoul, random people living in different types of residential area | Target resident who has resided for over 2 years (lease term) and who can understand a local map |
| Period | For six months of 2015–2016 | About 30 minutes testing |
| Sample | Valid sample 152 (type 1: 31, type 2: 48, type 3: 32, type 4: 41) | Over 30 samples by type of residential area |
| Test items | Sample information (age, residential period, gender, occupancy), sample cognitive information (home, amenities, station, landmark, route), living village (boundary, boundary factors) | Drawing up a cognitive map directly |
| Test-method | Guidance concerning each test item with presentation and then drawing cognitive factors up on a local map by experimenter | Small group test (about 10 persons) |
| Test-analysis | Primary analysis: mapping, data cording, data cleaning Secondary analyses: descriptive statistics, regression analysis | Programs: Spss 18, Stata 11 |

For the primary analysis, the types of boundaries, the scope of cognition, and the main moving lines were examined through mapping. The secondary analyses focused on measuring the area, the population, and distance by portal map sites. Data from the SGIS (Statistical Geographic Information Service, Statistics Korea) were also utilized to obtain quantitative scale values of the completed cognitive map.

Table 4. Resident Cognitive Test Process

| Step 01. Preparation | Step 02. Resident Cognitive Test | Step 03. Primary Analysis (mapping, cording) | Step 04. Secondary Analysis (living village character) |
|----------------------|---------------------------------|-----------------------------------------------|--------------------------------------------------|
| Sample selection, Test explanation, Sample information | Sample cognitive information, Living village drawing, Boundary reason | Mapping (cognitive information map) Data cording (area, population, distance, cognitive factors frequency) | Boundary character, Size character (area, population, distance), Territory character (inside, boundary, outside) |
recognized by residents in terms of types of residential areas. The test was conducted on 200 men and women residing in Seoul, and 152 valid samples were selected considering the reliability of responses and the period of residency. In addition, at least 30 valid samples were secured according to the type of residential area. If residents were deemed capable of interpreting a map, they were asked to indicate the amenities, public transportation, landmarks, and main moving lines on a map before describing the scope of a living village.

5. Living Village Characteristics

5.1 Boundary Characteristics of a Living Village

In his neighborhood unit theory, C.A. Perry described boundaries as important elements that create a sense of safety within the neighborhood unit as well as a sense of belonging. In the Seoul Metropolis Basic Plan (2015), Seoul City considered an administrative division as a principle of boundary and designated a residential living zone through review on the nature, urban structure, traffic flow, and size of the population in the scope of an autonomous district.

Tests were conducted in this current study to determine the boundary factors recognized by residents according to the types of residential area and the boundary characteristics based on frequency. The test method requires the resident to draw the boundary of the village on a map, and write the reason for it on each side. As a result of the tests, a total of 628 boundary elements were derived from 152 effective samples. The average number of boundary elements was 4.13, and boundary characteristics were classifiable. The boundary factors were classified into 25 detail factors within 5 categories (Table 5.).

Table 5. Cognitive Boundary Factors

| Category (5) | Detail Factors (25) |
|--------------|---------------------|
| Street       | Main-street, sub-street, side-street, crossroad, railroad, street pattern |
| Facility     | Landmark, school, shopping area, traditional market, office, factory |
| Housing      | Housing type, apartment complex housing and other use |
| Nature       | Mountain, river, park, hill |
| Human-Behavior | Behavior scope, local bus route, Exchange experiences, administrative district, use district, place name |

The residents recognized categories in order of street boundary (35.35%) > behavioral boundary (24.2%) > facility boundary (14.54%) ≥ housing boundary (13.54%) ≥ natural boundary (12.26%). The residents recognized the importance of detail factors in the order of (i) behavioral scope (17.68%), sub-street (16.24%), and main-street (14.01%) (recorded as high as 10% to 18%), followed by (ii) apartment complexes (8.6%), commercial buildings (7.17%), mountains (5.41%), and administrative districts (4.46%), differences in housing groups (2~4%), and side-streets, etc. (1%). For the perceived boundaries, the boundary factors of visual clarity, behavioral constraint (safety, access control), and public interest were prioritized. While it is necessary to examine the existence of boundary factors in terms of natural boundaries, most factors need to be taken into account at the time of designating the boundary, as they exist within the urban residence. Of the detail factors, behavioral scope indicating the highest frequency was overlapped with the main-street, sub-street, and apartment complex boundaries.

For a physical boundary, when it is correlated with behavioral scope, it tends to be recognized as an actual boundary. In other words, the designation of a living village needs to consider not only physical boundary factors, but also appropriate size and scope in terms of the residents’ activities. Meanwhile, the recognition of the administrative division boundary was recorded as low as 4.46% although it exists in all residences. The participants responded that this is due to the difficulties in recognizing the boundary of administrative divisions and because the administrative divisions were of a larger scale than the scope of activities.

The average values of the high-frequency boundary factors were compared in order to examine the boundary characteristics by types of residential area (Fig.1.). For the street boundary, types 2 and 4 are high, and types 1 and 3 are low, based on the average value. Since types 2 and 4 were established according to a plan, taking liner and grid-type forms in terms of length and housing demarcation, they can be easily recognized due to clarity and regularity. For the facility boundary, recognition was low except for type 1. Since type 1 mostly comprised of low-rise houses, the scale of schools or commercial buildings is relatively large. For types 3 and 4, the rate of apartment complexes...
was much higher than other detail factors, because this factor is ranked high in terms of behavioral control and visual recognition, while a special bond is formed by the residents around an apartment complex. In the case of behavioral scope, high frequency was indicated in all types, but great differences were observed in the cases of types 1 and 4, with different characteristics of streets and lots. This means that differences exist in behavioral scope according to the urban tissue, and standards need to be changed according to the types of residential area at the time of designation of a living village.

5.2 Scale Characteristics of a Living Village

While the scale of a living zone varies among theories, it is considered to be the most useful means of explaining the characteristics of a living zone. Generally, the scale of the living zone is based on three elements: area (m²), size of population, and distance (m). In order to study the scale characteristics and to conduct regression analysis on resident cognitive tests, a hypothesis was established, stating that 'the scale of a living village varies depending on types of residential area'. For the purpose of analyses, the scale of the living zone that is influenced by local and individual characteristics was controlled to examine the correlations between types of residential areas and scale. This examination focused on generating the actual scale of a village along with verification of hypotheses. For the statistical method theory, Ordinary Least Square (OLS) was used in consideration of the number of samples. For a regression equation, the resident cognitive area, population and distance were considered as dependent variables, and 4-types of residential areas and 5 control variables (period, transport station, landmark, amenities, occupancy) that influence scale cognition were designated. The basic regression equation is as follows.

\[ y_i = a_1 d_1 + a_2 d_2 + a_3 d_3 + a_4 d_4 + \sum_{j=1}^{5} \beta_j x_{ij} + \varepsilon_i \]

(\(y_i\): dependent variable, \(a_1\)–4: coefficient of dummy variables, \(d_1\)–4: type dummy variables, \(x_{ij}\): control independent variables, \(\beta_1\)–5: dummy variables of control independent variable, \(\varepsilon_i\): error)

As a result of analyses, the three scale standards were type 4 > type 2 > type 1 and 3 based on a regression coefficient value, which indicates the existence of correlations between type of residence and scale of a village. First, the village cognitive area was large in the planned residential area. As the planned residential area consists of a grid-type street network, homogeneous lots, and identical housing types as shown in Table 2., the urban tissues show strong similarities, and the cognitive areas are considered to be large. In addition, the village cognitive area was proportionate to the number of landmarks (p<0.05), the number of used stations, and the period of residence (p<0.1). Second, the village cognitive population varies depending on the residential density, and this is related to housing type. The highest population was recorded for type 4 as this type consists of high-density apartment house complexes. On the other hand, the lowest population was recorded in type 1, composed of single-family houses and small-scale apartment houses. It is interesting to note that the zone value of population in type 2, mostly composed of single-family houses, was higher than that in type 3 which includes apartment complexes. This is because type 2 is larger in terms of area, and the rate of small-scale apartments (multi-family housing, row housing, etc.) with medium density is high based on the development of individual lots. On the other hand, type 3 indicated considerable variation by area in terms of residential density and housing type, since the existing low-rise residences are mixed with apartment complexes subsequent to redevelopment. Among the control variables, only the period of residence was significant (p<0.05). Third, for coefficient value of village cognitive distance, the deviation by type of residential area was smaller than that of the other scale characteristics. This is because residents' physical moving distance and village form were not standardized. In particular, as seen in types 2 and 4, based on street boundary, a large-scale residence is similar to a standardized village format; however, types 1 and 3 were mostly non-standardized, so deviations occurred in terms of distance of the long side of the village. Independent variables influencing cognitive distance were significant in terms of the number of used stations, the period of residence (p<0.05), and the number of landmarks (p<0.1), indicating proportional relationships.

Table 6. Regression Analysis of Living Village Size

| Cognitive Area Analysis | Cognitive Population Analysis | Cognitive Distance Analysis |
|-------------------------|-------------------------------|-----------------------------|
| **Observations**        | **Observations**              | **Observations**            |
| 122                     | 122                           | 122                         |
| 1.324                   | 1.324                         | 1.324                       |
| 1.496                   | 1.496                         | 1.496                       |
| 1.994                   | 1.994                         | 1.994                       |
| 0.994                   | 0.994                         | 0.994                       |
| 0.994                   | 0.994                         | 0.994                       |
| **Standard error in parentheses** | **Standard error in parentheses** | **Standard error in parentheses** |
| *** p<0.01, *** p<0.001, *** p<0.001 | *** p<0.01, *** p<0.001, *** p<0.001 | *** p<0.01, *** p<0.001, *** p<0.001 |

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Of the independent variables that exclude dummy variables, the period of residence was significant in all three scale characteristics. Valid samples were based on two years as specified in the domestic lease, because residents tended to form a special bond when they resided for 2 years or longer. Even in regression analysis, the period of residence was proportionate to the scale of a village, which indicated that residents' behavioral characteristics need to be considered at the time of designation of a living village.

Meanwhile, the cognitive area, the cognitive population, and the cognitive distance value were assumed through the use of a regression model (Table 6.) for the purpose of quantification of the scale of a living village (Table 7.). The cognitive area of a village was 194,333 m$^2$ on average, the cognitive population was about 6,465, and the cognitive distance was about 719 meters. Considering the types, the cognitive area was 150,000~260,000 m$^2$, the cognitive population was about 4,000 to 9,000, and the distance of the long side of the village was about 600 to 800 meters.

Experimental analyses showed a hierarchy in terms of area, population, and distance according to types of residential area in a living village, which implies that there are correlations between the physical characteristics of residences and scale (type 4 > type 2 > type 3 > type 1). In addition, of the scale characteristics, the standard deviation of the average distance value was regular among the types compared to the area and population, which is considered to be useful at the time of designation of a living village. However, in the case of a combination of low-rise houses and apartment complexes (type 3), deviation is high according to scale characteristics, so precautions need to be used with regard to analyses on residence.

In order to examine the relationships between a cognitive village and the small-scale living zone, the median values of a cognitive village and administrative division were compared by scale on the test subject site. Compared to the resultant administrative division, the cognitive area was 0.148% and the cognitive population was 0.211%, indicating considerable differences. Compared to administrative division (0.98 km$^2$) the resident participatory village project (Seoul residential environment management 54 projects, 0.037 km$^2$, 2011~2015), the median value of the project areas recorded 0.038%. This indicates differences in spatial scale between the living zone recognized by residents and the small-scale living zone and village unit project area based on the city planning system. The standards need to be clarified in order to conduct continuous residence management.

### 5.3 Area Characteristics of a Living Village

This chapter examines the characteristics of a living village area recognized by residents. Based on the fact that landmarks, stations and amenity facilities have strong correlations with living village cognition, as seen in the regression analysis, the degree of cognition of village areas by residents was analyzed. First, a living village designated by controllers of the experiment was divided into three areas: inside the boundary, on the boundary, and outside the boundary. The distribution of the three above-mentioned factors of landmark, station, and facility was examined. The statistical value was calculated based on the per-sample rate of the three factors in consideration of the number of samples by type of residential area.

Landmarks were recognized in the order of inside the boundary > outside the boundary > on the boundary on average, as was shown for types 1 and 4. However this hierarchy differed in type 2 (inside the boundary > on the boundary > outside the boundary) and in type 3 (outside the boundary > inside the boundary = on the boundary). For the number of public transport stations, the hierarchy

| Table 7. Summary for Cognition Area of all Types |
|---|
| **Classify** | **Type 1** | **Type 2** | **Type 3** | **Type 4** | **Total** |
| **Area (m$^2$)** | | | | | |
| m | 150,473.80 | 192,306.80 | 159,192.50 | 257,294.70 | 194,333.30 |
| sd | 62,309.11 | 71,923.34 | 98,181.00 | 94,967.40 | 92,107.60 |
| p50 | 135,605.70 | 184,852.40 | 130,733.40 | 233,169.00 | 159,192.50 |
| **Population (people)** | | | | | |
| m | 4,337.09 | 6,584.00 | 5,162.71 | 8,952.80 | 6,465.48 |
| sd | 1,490.60 | 1,877.03 | 2,050.02 | 2,409.92 | 2,629.32 |
| p50 | 3,954.21 | 6,290.90 | 4,579.44 | 8,256.32 | 6,241.17 |
| **Distance (m)** | | | | | |
| m | 654.05 | 731.42 | 654.56 | 806.18 | 719.63 |
| sd | 145.65 | 134.04 | 181.69 | 145.74 | 161.46 |
| p50 | 618.78 | 722.78 | 626.49 | 778.49 | 699.58 |

| Table 8. Cognition Degree of Living Village Factors |
|---|
| **Location of factors** | **Landmark (Landmark/n)** | **Public Transport Station (Station/n)** | **Using Amenity Facility (Facility/n)** |
| **Inside** | **Boundary** | **Outside** | **Inside** | **Boundary** | **Outside** | **Inside** | **Boundary** | **Outside** |
| Type 1 (n=31) | | | | | | | | | |
| Inside | 1.23 | 0.39 | 0.65 | 1.00 | 1.87 | 1.06 | 4.03 | 1.74 | 2.00 |
| Type 2 (n=48) | 0.67 | 0.60 | 0.38 | 0.54 | 2.40 | 1.02 | 3.21 | 1.98 | 2.13 |
| Type 3 (n=32) | 0.28 | 0.28 | 0.56 | 1.16 | 1.69 | 1.00 | 2.94 | 1.00 | 1.63 |
| Type 4 (n=41) | 0.85 | 0.20 | 0.59 | 1.37 | 1.51 | 0.83 | 3.63 | 1.20 | 1.05 |
| Total (n=152) | 0.75 | 0.38 | 0.53 | 0.99 | 1.90 | 0.97 | 3.43 | 1.51 | 1.70 |
was on the boundary > outside the boundary > inside the boundary in low-rise residences in types 1 and 2, and was on the boundary > inside the boundary > outside the boundary in complex residences in types 3 and 4. In all cases, the rate of stations was high in the boundary, demonstrating that the rate of the boundary of streets that are larger than the sub-street and the public transportation roads is high. For the used facilities, the hierarchy is inside the boundary > on the boundary and outside the boundary, which indicated similarities by type. For frequency of use, the order was inside the boundary (3.43) => on the boundary (1.51) + outside the boundary (1.7), which indicates a larger scope of actions taken by residents than those occurring in a living village. In addition, compared to the radius of action drawn by residents in a test, the order was boundary-oriented (0.46) => within the boundary (0.25) > similar to inside and outside the boundary (0.18) > outside the boundary-oriented (0.08) > outside the boundary (0.03), which indicates actions are facilitated around the boundary.

Considering this, the area of a living village is not characterized by a complete structure with an encircled boundary but by a spatial unit for convenient walking. The area inside the boundary is a primary scope of action in a highly accessible living village and requires facilities that support basic life. The boundary is not a means of encirclement, but a highly cognitive physical factor, and the boundary area is frequently perceived of and used as an open network space. In addition, the area outside the boundary is also the area inside the boundary of an adjacent village. Such an area can be considered as providing scope for selective actions by residents of an adjacent village along with unique characteristics of the village. In this regard, given the area characteristics, a living village is not an independent unit with binding power, but an area with spatial scope, where physical division can be made and a special bond can be created among residents, where a functional network with an adjacent living zone needs to be allowed. In reality, regarding the living zone plans in Nerimagu in Tokyo, Japan, differences were observed between the living zones recognized by residents and the administrative boundary, where the boundaries between living zones overlap on a living zone plan map when considering the functions of the boundary area.

6. Conclusion
This study suggested a living village as the minimum-unit within which residents lead their daily lives, in response to the periodic current trend whereby urban development is transformed into urban regeneration. For the purpose of logical deployment, the study revealed the need for the re-designation of the village unit spatial system for harmonization between legal urban planning and planning by resident participation in consideration of the limitations of the small-scale living zone in Seoul City. In addition, the present village unit has no clear standards for scale or boundaries, causing difficulties in establishing a community or a special bond between residents; the study thus argued for the need for the designation of a living village and described the characteristics of a living village.

As the result of tests, 5 categories and 25 boundary factors were generated in terms of characteristics of the boundary, and correlations existed by types based on area, population and distance in terms of characteristics of scale (Tables 5., 7.). A living village should be therefore designated in consideration of the type of residential area in order to secure compatibility with resident-participatory living zone plans. Characteristics of area were more appropriate to consider a living village as a spatial scope that allows network instead of functional completeness (Table 8.). Perry's theory put forward in the past, featured complete territoriality whereas New Urbanism's TND and a living village required territorial openness and functional mutual complementation in the present where metropolitan cities are created. This is due to the fact that neither expansion of urban scale nor diversity of resident requirements can be satisfied in a village unit. Therefore, a living village can establish a functional network with adjacent living zone along with diversity and create a comprehensive and sustainable urban living zone through connection with a higher living zone plan.

The study carries significance as empirical research that generates a living village character through types of residential area and resident cognitive tests. However, even considering the limitations of experimental studies, this study required an analysis that considered the characteristics of residents and larger numbers of samples to make sense of the experiment. And although pre-training was conducted, some 20% of the samples were invalid and needed to be easily understood by residents.

Finally, domestic residence where urbanization was rapidly implemented experiences large deviation by area, problems need to be generated through pubic society and resident governance for realization of residential welfare, and a process to resolve them needs to be repeated. A living village requires a concrete method of designation as a spatial subject where problems are shared and resolved, and subsequent research on guidelines for designation of a living village and verification tests are needed in connection with village projects to that end.

References
1) Clarence Arthur Perry. (2013) Neighborhood and Community Planning. Seoul: Communication Books.
2) Peter Katz. (1994) The New Urbanism: Toward an Architecture of Community, NY: McGraw-Hill Professional Publishing.
3) Seoul Development Institute. (2009) Urban Form Study of Seoul. Seoul: Seoul Development Institute.
4) Jae Seob, Yang & Seon Hui Nam. (2016) A Planning Monitoring Study on the Community Plan of Seoul. Seoul: The Seoul Institute.
5) Yeo Kyung, Lee. (2015) A Proposal of Integrated Urban Design System. Seoul: Chung-ang University.
6) SungHoon, Kim and KyungHoon, Lee (2014) Research on the Planning Characteristics for Low-rise Residential Areas in the Suburbs of Japan. Architectural Institute of Korea, 30(3), pp.31-42.
7) Seoul Metropolitan Government. (2015) 2025 Seoul Urban and residential environment basic plan. Seoul: Seoul Metropolitan Government.
8) http://planning.seoul.go.kr/
9) http://www.portlandoregon.gov/