

Residents' Satisfaction with Visual Appearance of the Housing Environment in Korean Multi-Family Housing

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주거환경에 대한 거주자 시각만족의 경험적 모형

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요 약

주거환경에서 거주자의 '시각만족'(residents' satisfaction with visual appearance)은 더 큰 추상적 개념인 '주거만족'(residents' housing satisfaction)과의 밀접한 인과적 관련(Francescato et al, 1979) 때문 뿐만 아니라 인간 기본 욕구 중의 하나인 미적 욕구의 충족과 관련되어 있다는 점(Chin, 1991)에서도 중요시 되어야 할 이론적 개념이다. 본 연구에서는 거주자의 시각만족을 종속지표로 보고, 다양한 영향 가설변수들과의 인과적 관련도를 경로분석(path analysis)을 통해 검증하고 있으며, 어떤 변수가 어떤 이유(경로)로 또는 얼마만한 크기로 거주자의 시각만족에 영향을 주는가가 중점적으로 토의된다. 한국의 6개 대단위 주거단지로부터 다단계표집 방법과 설문면담 방법을 통해 646명의 응답이 수거되었다. 분석의 첫 단계로써, 다수의 설문문항을 본 연구의 가설 변수로 집약하기 위한 요인분석(factor analysis)이 사용되었고, 요인 분석으로부터 추출된 변수들간의 인과적 관련도를 검증하기 위해 최종적으로 경로분석이 사용되었다. 본 연구의 결과를 요약해 볼 때, 본 연구의 가설 변수 대부분이 최종 종속변수인 거주자의 '시각만족'에 유의한 인과 영향을 보이는 것으로 나타났으며, 구체적으로 '시각적 무질서'(visual disorder), '시각적 단조로움'(visual monotony), '단지 과밀감'(development crowding) 등이 부정적 영향을, '시각적 매력'(visual attractiveness) 과 '인근 자연녹지의 존재'(presence of nearby natural environment)등이 긍정적 영향을 미치는 것으로 파악되었다. 그 외에도 '옥외공간이용 편리'(outdoor or recreation convenience)와 '이웃만족'(satisfaction with neighbors), 그리고 '주거환경 유형'(building type, building arrangement type)등도 유의한 인과적 관련을 보이므로써, 기존 문헌들이 제시하고 있는 것보다 훨씬 다양한 변수들이 다양한 경로를 통해 거주자 시각만족의 영향인자가 될 수 있는 가능성을 제시하고 있다. 가설 변수의 하나인 '길찾기의 난이 정도'(difficulty of way-finding)와 종속변수간에 유의한 관련도가 나타나지 않은 이유로 길찾기 변수가 '시각만족'보다는 거주자의 '안전만족'(safety)과 관련된 변수일 가능성도 아울러 지적되었다. 본 연구의 결과로부터, 주거 계획 및 설계분야 그리고 추후 관련 연구 분야를 위한 여러 제안들이 제시되었다.

Residents' satisfaction with visual appearance of the housing environment has been an important predictor of residents' more general affective responses, e.g., residents' housing satisfaction or residents' perceived life quality. Enosh, Leslau, and Shacham(1984), in their public housing study in Israel, found that the issues related to residents' affective responses toward visual appearance of their housing environment were significant sources of residents' satisfaction with the overall living environment (e.g., residents' housing satisfaction). Gurin, Veroff, and Feld (1960); Dalkey (1972); Francescato, Weidemann, Anderson, and Chenoweth(1974); Chin, Weidemann, and Anderson (1991); and Chin (1991, 1992) also reported similar results. Specifically, Chin(1991) further discussed that residents' satisfaction with visual appearance was an important issue to consider, since it would not only be significantly related to residents' housing satisfaction but also represent one of human basic needs (e.g., aesthetic needs, Maslow(1970)) that should be fulfilled in the given environmental context.

Thus, It is hard to argue that the increase of residents' satisfaction with visual appearance of the housing environment is one of the important design and/or planning goals in the housing environment; however, it seems that not many efforts in the previous studies have been devoted to investigating potential predictors of residents' satisfaction with visual appearance. This study seeks to investigate potential predictors of residents' satisfaction with visual appearance in Korean housing environments, examining the issues found in existing research, and further to develop a more extensive empirical model of satisfaction with visual appearance by path analysis. This study also seeks to consider implications for future research as well as design and planning deci-

sions, based upon the results.

I. ISSUES

1. Difficulty of Way-Finding

One of the potential predictors of residents' affective response toward the visual aspects of the environment that have been frequently reported in the previous studies is the issue of perceived environmental legibility(Lynch, 1961, 1965; Carr, 1967; and Nasar, 1983). The construct, perceived environmental legibility can be defined as the degree of people's perception of difficulty of way-finding or ease of orientation in the environment. Carr(1967), in particular, suggested that adequate environmental legibility is necessary in reducing the stress of way-finding, and can eventually improve people's overall perception of the visual appearance of the environment(e.g., satisfaction with visual appearance). He further stated that people's perception of quality of life might be also influenced by improved perception of environmental legibility. Nasar(1983), in the study of adults' visual preferences in residential scenes, also found that the lack of ease of orientation (difficulty of way-finding) negatively affect people's preference with visual appearance.

2. Visual Monotony

While it seems clear that the environmental legibility issue is important in determining people's positive feeling toward the visual aspects of the environment, many studies(e.g., Wohlwill, 1966; Craik, 1970; Rapoport and Hawkes, 1970; and Kaplan and Kaplan, 1982) have reported the positive influence of perceived visual variety(or the negative influence of visual monotony) on people's visual satisfac-

tion. Wohlwill (1966) has suggested that some degree of visual variety can afford an interesting and satisfying visual (perceptual) experience. He found that people were more likely to be visually satisfied with their surrounding environments, when the environments contained an optimal level of visual variety in the environment. He has indicated that people prefer settings that are visually interesting and compelling without bewildering.

The extensive study by Kaplan and Kaplan (1982), thus, has introduced both visual variety and environmental legibility as affecting people's visual satisfaction with environmental features. They showed that people were more visually satisfied with the environmental features that both offer them the opportunity to acquire additional information(i.e., visual variety) and help them make sense of the environment(i. e., ease of orientation).

3. Visual Attractiveness

Some studies have introduced people's emotional feelings (e.g., attractiveness, peacefulness, beauty, etc.) as intervening variables between people's specific cognitive responses (e.g., visual monotony, environmental legibility) and people's general affective responses (e.g., satisfaction with visual appearance). Russell and Pratt(1980) were among those who first emphasized the significant role of people's emotional feelings in explaining people's affective responses toward the visual quality of environments. They indicated that the cognitive measures themselves may not be very successful in predicting people's satisfaction with visual appearance, without considering emotional feelings, as well. What they further indicated was that people's affective response such as satisfaction with visual appearance

may not be directly influenced by the specific cognitive measures(e.g., visual monotony, but indirectly via an appropriate intervening variables(e.g., emotional feelings).

4. Other Issues

There are also other issues that have been reported to be related to people's satisfaction with visual appearance. They are perceived visual disorder(e.g., perceived presence of vandalism or litter, Enosh et al., 1984), maintenance (Francescato et al., 1979; Weidemann, Anderson, Butterfield, and O'donnell, 1982), presence of nearby natural environment(Kaplan, 1985), and perceived crowding(Chin, 1991, 1992). Chin found that, in Korean housing studies, the residents who more strongly felt that their housing development was crowded were more likely dissatisfied with visual appearance of their housing development.

II. METHODS

1. Setting

Six large-scale housing developments in Seoul were selected based on the criteria of whether information about various housing attributes of the housing developments was available, and if the housing developments were large and diverse enough for sampling to represent the specific physical characteristics of the housing environment. The six large-scale housing developments selected were Gwa-Cheon, Gae-Po, Doon-Chon, Mok-Dong, Ban-Po, and Wha-Gok, all of which are located in the residential area of Seoul¹⁾. They were developed by public sector agencies, either National Housing Corporation(NHC) or Seoul Municipality. The distances from Seoul CBD of

these developments were between 7–15km, and the year of construction were between 1977–1986.

Among the six large-scale housing developments, groups of buildings were chosen which had a relatively small range in dwelling size(e.g., between 66m² and 99m²) and number of bedrooms (e.g., 2 or 3), for the purpose of controlling the range of residents' income.

2. Resident Interview

This study used structured self-reports(e.g., questionnaire) from residents about various perceptions of, and satisfaction with their housing environment. Most interview items were from the Occupant Satisfaction and Perception Survey(OSPS) developed by Francescato et al. (1979) and other relevant research. All subjective items, except for two items of general life satisfaction and housing satisfaction, were measured on a five point scale with the mid-point of " I don't know " ; the most negative response being scored as " 1 " and the most positive scored as " 5 " .

As the interview procedure, the modified structured interview form²⁾ was used to get high response rates from residents. Twelve interviewers, all female college students, were to visit the selected housing units with the interview forms and answer sheets, to show the forms to the residents, and to record the residents' responses on the answer sheet. For the purpose of pretesting the interview items, a pilot interview was also conducted. From the results of the pilot interview of 12 housing units, a number of redundant and obscure items were revised or dropped from the interview.

Using the revised structured interview forms, which finally contained 132 items³⁾, the

12 interviewers contacted the housing units to be sampled over a 5 and 1/2 day period during the summer of 1989. From the 1644 housing units sampled, a total of 646 housing units were interviewed. The interview response rate varied from site to site, with an average of 39%. While some residents refused to be interviewed, most of non-interviewed units were the result of no one being home at the time the interviewer visited the unit.

3. Variables

The variables(or index variables) to serve as operational measures of the constructs of the interest of this study were developed based upon factor analyses of the items. It was expected that there would be sets of highly inter-correlated items Which represent underlying constructs, since more than one item about the constructs were asked. From the results of factor analyses, a total of 44 variables (specifically, 18 index variables and 26 single item variables)⁴⁾ were selected for further analysis. Some factors were divided into two or more indices for conceptual clarity. Each of indices were created by combining the items which had factor loading scores greater than .40.

Table 1 shows nine of all forty-four variables selected and their interview items, since they are the variables of the interest of this study. The nine variables were development crowding, visual monotony, perceived presence of nearby natural environment, visual disorder, difficulty of way-finding, satisfaction with maintenance, satisfaction with dwelling view, visual attractiveness, and finally, satisfaction with visual appearance, which is the criterion of this study.

III. RESULTS

1. The Empirically Derived Model⁵⁾

Figure 1 shows the empirical model obtained by path analysis. The model shown in Figure 1 is the summarized version of the original model which used all 43 variables. The figure of the originally derived model by path analysis was

much more complicated than this figure, showing all paths between the 43 variables. Therefore, for the simplicity it was briefly summarized to Figure 1 which shows only the paths between the variables of the interest. Yet, other variables still show their names and their beta weights on each criterion variable in parentheses⁶⁾.

Table 1. Variables and Interview Items of the Interest

Variables*	Interview Item
Visual Disorder	v60; There is a lot of trash or broken glasses in this housing development.
	v61; The lawn areas outside my building or the building walls were frequently destructed or spoiled by scrawls.
Development Crowding	v55; This development is too small for the number of people who live here.
Visual Monotony	v100; This housing development looks monotonous, since the buildings and streets here all look alike.
Presence of Nearby Natural Environment	v38; It is good that the natural environment is not far from here.
Satisfaction with Maintenance	v57; This housing development is well maintained including garbage collections, in general.
Difficulty of Way-Finding	v99; I or one of my family had knocked other apartments because we were in an wrong building or floor.
Visual Attractiveness	v101; This development looks beautiful.
	v102; This development looks interesting.
	v103; This development looks peaceful.
Satisfaction with Dwelling View	v23; The view from living room or bedroom of my home is very good.
Satisfaction with Visual Appearance	v105; In general, I am satisfied with the visual appearance of this development.

Note.

* Among the variables, satisfaction with visual appearance is the criterion variable of this study.

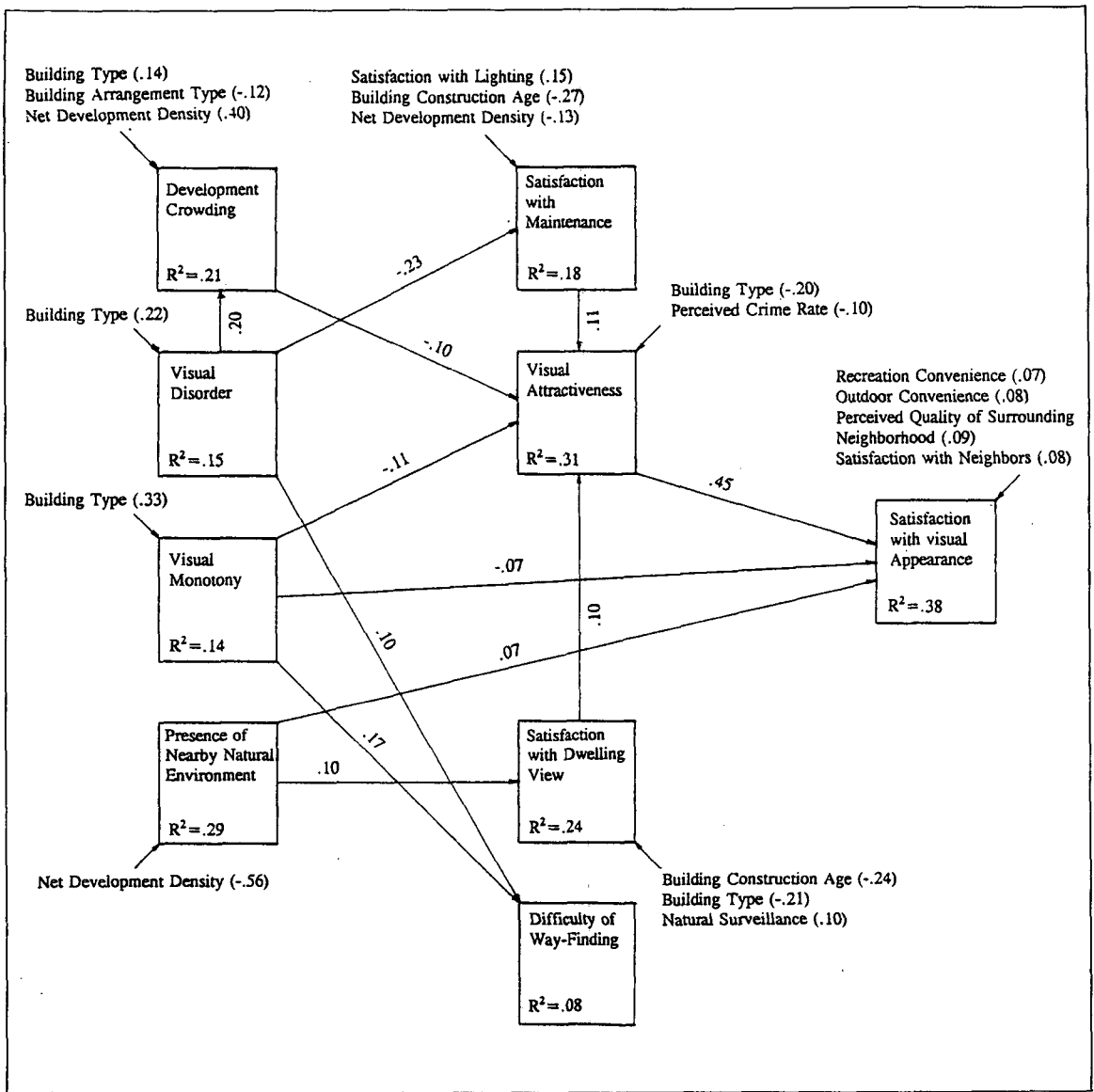


Figure 1. The Empirically Derived Model of This Study

Note. The paths/arrows in the figure represent predictors significant at $p < .05$ level. The value of R^2 indicates the variance of each criterion variable predicted by all significant predictors. The numbers shown above the paths are path coefficients which are the same as beta weights. As discussed in the text, this figure is a summarized version of the original path model. In the figure, the predictors that are not the variables of the interest of this study show their names and path coefficients in parentheses, instead of their paths.

The variables of the interest of this study were all found to be significant predictors of the final criterion, except for perceived difficulty of way-finding. As shown in Figure 1, visual attractiveness, visual monotony, and presence of nearby natural environment were direct predictors of satisfaction with visual appearance ($R^2=38$). The direct effects of visual attractiveness and presence of nearby natural environment were positive (+; $\beta=.45, .07$, respectively) on the criterion, while visual monotony showed the negative effect ($\beta=-.07$). This suggests the residents who more strongly felt that the natural environment is present nearby their housing development, and that their housing development is visually attractive, were more likely satisfied with visual appearance of their housing development. On the contrary, the residents who more strongly felt that their housing developments look monotonous (perceived visual monotony) were more likely to be dissatisfied with visual appearance of their housing developments. The negative effect of perceived visual monotony on the criterion supports the previous studies (e.g., Kaplan and Kaplan, 1982).

Visual attractiveness was the strongest predictor among the direct predictors, whose effect was much superior to the others. The significance of visual attractiveness found in this study also supports Russell and Pratt(1980)'s argument that emotional feeling, such as perceived attractiveness, beauty and pleasantness, would be more important than other variables in determining people's affective response toward the visual quality of the environment.

While development crowding, visual disorder, satisfaction with maintenance, and satisfaction with dwelling view were not direct predictors of satisfaction with visual appearance, they clearly demonstrated their indirect effects

via their own relevant intervening variables. For example, except for visual disorder, other three variables were direct predictors of visual attractiveness that is a direct predictor of the final criterion, satisfaction with visual appearance. This means that the effects of the three variables on satisfaction with visual appearance were indirectly mediated by visual attractiveness.

Their path coefficients (or beta weights) to visual attractiveness were, as also shown in Figure 1, .11(satisfaction with maintenance), .10 (satisfaction with dwelling view), and -.10 (development crowding). Thus, we can say that when the residents were more satisfied with maintenance, were more satisfied with the outside view from their dwelling, or more strongly felt that their housing development was crowded, they were more likely to feel that their housing development looked attractive (visual attractiveness); hence, in consequence, they were more likely to be satisfied with visual appearance of their housing development.

Similarly, the effect of visual order on the final criterion was mediated by either satisfaction with maintenance ($\beta=-.23$ and .11) or development crowding ($\beta=.20$ and $-.10$) to visual attractiveness ($\beta=.45$), and eventually to satisfaction with visual appearance. The indirect effect of visual disorder on satisfaction with visual appearance was negative (-) through various paths. This also indicates that the residents were more likely to be dissatisfied with visual appearance when they more strongly felt that their housing development was visually disordered, via increased perception of development crowding and/or decreased satisfaction with maintenance; and, hence, via decreased perception of visual attractiveness.

In terms of difficulty of way-finding, it was significantly predicted by two variables (e.g., visual disorder and visual monotony), however, any significant paths to the criterion was not found.

IV. EFFECTS OF PREDICTORS

1. Environmental Attributes

Table 2. The Effects of the Predictors

Type	Variables	Effects		
		Direct*	Indirect**	Total
objective variables	Sex(male,0; female,1)	.	.01	.01
	Building type (row houses, 1; low-rise apartments, 2; mid-rise, 3; high-rise, 4)	.	-.19	-.19
	Building Arrangement Type (Linear, 0; U-shaped, 1)	.	.05	.05
	Net Development Density	.	-.06	-.06
	Building Construction Age	.	-.03	-.03
Subjective Variable	Perceived Crime Rate	.	-.05	-.05
	Satisfaction with Lighting	.	.03	.03
	Natural Surveillance	.	.02	.02
	Recreation convenience	.07	.01	.08
	Outdoor Convenience	.08	.	.08
	Perceived Quality of Surrounding Neighborhood	.09	.	.09
	Satisfaction with Neighbors	.08	.	.08
	Development Crowding	.	-.08	-.08
	Visual Disorder	.	-.09	-.09
	Visual Monotony	-.07	-.05	-.12
	Presence of Nearby Natural	.07	.05	.12
	Satisfaction with Maintenance	.	.07	.07
	Satisfaction with Dwelling View	.	.05	.05
Visual Attractiveness	.45	.02	.47	

Notes.

* The direct effect is the influence of one variable on another, that is unmediated by any other variables in a path model. Its value is exactly identical to the path coefficient (beta weights in this study) in a recursive causal system.

** These indirect effects were calculated as the product of two or more path coefficients shown in the relevant paths of the model. For example, as shown in Figure 1, the indirect effect of visual monotony on satisfaction with visual appearance was shown in the path from visual monotony to satisfaction with visual appearance, via visual attractiveness. Thus, the indirect effect(-.05) was calculated as the product of -.11(the path coefficient between visual monotony and visual attractiveness) and .45(the path coefficient between visual attractiveness and satisfaction with visual appearance).

One of the advantage of path analysis is that it enables one to measure the direct and indirect effect that one variable has upon another. Table 2 shows the direct, indirect, and total effect of the predictors on residents' satisfaction with visual appearance of their housing development. The total effect is the sum of di-

rect and indirect effects of each variables on the criterion. Among the variables, the relative importance of the predictor on the criterion can only be valid in comparison with the total effect of each variable.

As discussed before, a total of 44 variables were examined in path analysis, of which 19 variables were found to be significant predictors of satisfaction with visual appearance demonstrating direct and/or indirect effects. Table 2 shows the list of all nineteen predictors found in this study, and their effects on the final criterion based upon the results of path analysis. Among the nineteen predictors, five were objective variables that are either demographic variable(e.g., sex), or environmental attributes (e.g., building type, building arrangement type, net development density, and building construction age⁷⁾).

Concerning the environmental attributes, their indirect effects were $-.19$ (building type⁸), $.05$ (building arrangement type), $-.06$ (net development density), and $-.03$ (building construction age), respectively. The only positive effect on the final criterion was shown from building arrangement type, which indicates that the residents who living in a U-shaped building arrangement type were more likely satisfied with visual appearance of their housing development than those living in a linear type.

The negative effects of the others also indicate that the residents who lived in higher-rise housing, in higher development density, or in older housing, were more likely to be dissatisfied with visual appearance.

2. Subjective Variables

Table 2 also shows the subjective predictors including the variables of the interest. The var-

iables of the interest generally showed stronger effects than other predictors, that varied from $.05$ (satisfaction with dwelling view) to $.47$ (visual attractiveness). Among the variables of the interest, the second strongest predictor next to visual attractiveness was visual monotony (total effect = $-.12$) and presence of nearby natural environment (total effect = $.12$).

The interesting thing was to see the significant effects of two convenience-related issues (e.g., perceived recreation convenience, $.08$; and outdoor convenience, $.08$) on the criterion. Their effects were direct and positive, which means that the residents who more strongly felt that their outdoor area or recreation facilities outside were convenient were more likely to be satisfied with visual appearance of their housing development.

The direct and positive relationship between the criterion and other two variables, overall quality of nearby neighborhood ($.09$) and satisfaction with neighbors ($.08$) would be even more interesting. Similar to the convenience issues, they were not expected to be causally related to residents' satisfaction with visual appearance; nevertheless, their effects were significant, and were even stronger than some variables of the interest (e.g., satisfaction with dwelling view, whose effect was $.05$).

V. DISCUSSION

1. Environmental Legibility

As discussed before, all variables of the interest of the study except for difficulty of way-finding were found to demonstrate their direct and/or indirect effects on residents' satisfaction with visual appearance, in a either positive or negative direction. It was hypothesized that, as Carr (1967) and Nasar (1983) pointed out,

residents' perception of difficulty of way-finding could negatively influence residents' affective response toward the visual aspects of their housing environment; however, difficulty of way-finding was not found to be a significant predictor of satisfaction with visual appearance. This does not strongly support the previous studies.

There are possible explanations of the lack of the significant relationship between difficulty of way-finding and satisfaction with visual appearance. One is that the issue of environmental legibility may act its significant role as a predictor of people's visual satisfaction in urban environmental settings, but not in residential settings. With a different environmental context, the significance of environmental legibility on people's affective response toward the environment may change. It is necessary to note that most previous studies have found the significant relationship between environmental legibility and people's visual satisfaction only in urban commercial settings. Being more reasonable, another possible explanation is that people's perception of environmental legibility might be more strongly and significantly related to other issues (e.g., perceived safety) rather than to satisfaction with visual appearance. The empirical evidence of the significant appearance. The empirical evidence of the significant relationship between environmental legibility and people's perceived safety was shown in the study (Chin et al. 1991), supporting this argument. Chin et al. (1991) found that, also in Korean housing studies, residents' perception of difficulty of way-finding was not significantly related to residents' satisfaction with visual appearance but to residents' perceived safety. This might indicate that the residents who more strongly felt difficulty in finding the way to their hous-

es were more likely to feel that they were not safe. It is possible to say that when people don't know where they are or where they have to go, they would be more likely to feel unsafe, but not necessarily feel dissatisfied with visual appearance of the surrounding environment. This argument suggests that the significant relationship between environmental legibility and people's visual satisfaction should be further examined with other issues in future research, and in different environmental contexts as well.

2. Design AND/OR Planning Implications

In terms of design and/or planning implications, the effects of the objective environmental attributes on the criterion might be more meaningful than those of the subjective variables, since they would have often been the objects that the designer and planner practically deals with in their hands. Several objective environmental attributes were found in this study, whose effects on the criterion may suggest various design and /planning implications (e. g., building type, building arrangement type, and development density).

This study showed that as the type changes from low-rise to high-rise housing, the negative effects of building type on residents' satisfaction with visual appearance was clear and strong. In case of building arrangement type, the negative effect of a linearly arranged type on residents' satisfaction with visual appearance was also clearly reported. These all indicate that the planner or designer should consider that high-rise housing (as building type) and/or linearly arranged housing (as building arrangement type) might have more disadvantages than

low-rise housing and/or U-shaped arrangement housing, in terms of increasing residents' satisfaction with visual appearance. Furthermore, The negative effect of development density on satisfaction with visual appearance tells us that the management of the density is an important planning and/or design decision which can influence residents' satisfaction with visual appearance.

Other results that can be applied to the design and planning decision are also shown in this study. Providing more natural environment nearby the housing development, providing more visual variety to the housing development, providing more extensive maintenance program to prevent vandalism or visual disorder would all help to increase residents' affective response toward the visual aspects of the housing environment. In addition, providing a more satisfied outdoor view from dwelling, a more convenient outdoor area, and recreation facilities all would be also reasonable design and/or planning implications.

3. Other Substantive Issues

One of the additional findings of this study was that there might be various other issues related to people's satisfaction with visual appearance, that had not been examined in the previous studies. The convenience-related issues (e.g., recreation convenience and outdoor convenience) and satisfaction with neighbors were the examples. What this study suggests is that people's perception about other people sharing the environment together(e.g., neighbors in the housing environment), and about the degree of convenience of the environment in terms of use

would be important sources of people's affective responses toward the visual aspects of the environment, as well as the other issues related to the visual aspects of the environment(e.g., visual monotony). This also might indicate that the previous studies have been somewhat limited to hypothesize and, in turn, empirically find potential predictors of satisfaction with visual appearance. Thus, a further effort should be devoted in finding other possible predictors of satisfaction with appearance, with an agreement that the increment of residents' satisfaction with visual appearance is one of the important goals in housing planning and/or design.

IV. NOTE

1. The full description about research sites of this study including site maps is shown elsewhere (Chin, 1990, pp 131-140) in detail.
2. The modified structured interview method combined the advantages of both written questionnaire and personal interview. Recent studies in Korea(Lee, Park, and Chin, 1989) have reported that certain survey techniques, such as mail surveys, may not be the most appropriate methods to get high response rates from residents.
3. A full version of the interview form with 132 items is also shown in Chin (1990), pp 141-174. It contained not only the items related to the interest of this study (e.g., visual cognitive issues), but also the items related to many other issues(e.g., safety, prestige, residential attachment, and housing satisfaction) for the purpose of conduction other studies, as well. The studies using the other issues were reported elsewhere(Chin, Weidemann, and An-

derson, 1991; Chin, 1991; Chin, 1992).

4. The results of factor analyses are also shown in detail in Chin (1990), and can be obtained from the authors.
5. Respondents' demographic information based upon descriptive analysis is not included in this paper due to the limit of space. In terms of education, 57% of the respondents had experience of college education; 76% of the respondents were younger than 46 years, and 61% were between 31 and 45 years old; concerning sex, most of the respondents interviewed were females (89% of the total respondents). Among the respondents, 42% reported their monthly income higher than 1400\$. For more information, see Chin (1990, pp 58-64).
6. Someone may wonder why this study incorporates all 43 variables in path analysis, instead of having just nine variables of the interest. Path analysis in this study was conducted by a multi-stage of (a series of) regression analyses, where each variable turned out to be criterion. One of the basic analytical assumptions underlying path analysis is that the effective way to control other related independent variables and to reduce the error variance would be to measure all relevant variables and put them together into each regression equation (Pedhazur, 1982). Furthermore, the additional purpose of this study was to find out potential predictors, if any, which have not been examined in the previous studies.
7. The variable of building type was technically considered as a continuous variable; town houses (2 floors), 1; low-rise apartments (3 floors), 2; mid-rise apart-

ments (5 floors), 3; high-rise apartments (15 floors), 4. The variable of building arrangement type was dummy-coded; the linear type was coded as 0; and the U-shaped type coded as 1. In terms of sex, it was also dummy-coded; the male resident was coded as 0; and the female resident coded as 1.

8. Someone may argue that the building type in this study should be dummy-coded, since it would not be a continuous variable, but a nominal variable. However, a more critical argument for this matter variable. However, a more critical argument for this matter is still remained. It was considered that building type in this study has various continuous characters (e.g., building height, development density, building ratio, etc.). If we use a dummy variable as a predictor, due to the basic difference between ANOVA and regression analysis, we couldn't see the trend of the relationship (e.g., linearity) between the predictor and criterion. From the result using a nominal predictor as dummy coded, we know only whether there is significant mean differences of the criterion (e.g., residents' housing satisfaction) between nominal groups (e.g., low-rise housing group, mid-rise housing group, etc.). In spite of a possible argument about its continuous character, the result of this study clearly shows that there is the trend of linear influence of building type on residents' housing satisfaction; nevertheless, it should be noted that the beta weights of building type on the criterions do not have any specific meanings as those of other variables have.

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