Ecological Structure and Change in Korea, 1970~1980*

— A Factorial Ecology —

Dai-Yeun Jeong**

1. Aim of the Study

This thesis presents a social ecology of Korea for the years 1970 and 1980 and includes a consideration of ecological change over this period; a decade of significant social and spatial transformation. Ecological analysis has focused on the social structure of cities and on changes to urban social structure. Social ecology represents one way in which sociologists have studied social structure, and it is an approach which conceptualizes and interprets social structure and social change in a spatial way.

Korea experienced modernization during this century. At a very general level,

* This thesis has been made possible by financial support from the University of Queensland, Australia. As well, without receiving research leave from Cheju National University and permission from the Ministry of Education, this study could not have been done. I am very grateful to them for the support.

** Assistant Professor of Sociology, Cheju National University.

modernization has been advanced in various ways (Lim 1983) ; by the democratization of politics, the industrialization of the economy, the urbanization of population, and a transition towards individualism.

Korea has now become one of the fastest developing countries in the world. This has brought a rapid social structural change which in turn has had very significant implications for spatial patterning. Most particularly, Korea's social structure changed remarkably over the decade 1970 — 1980.

The aim of this study, then, is to consider the nature of this change. It will analyze Korean social structure and the change to this social structure over the period 1970 to 1980. This is done from a social eclogical perspective, with an analysis being made using factorial ecology. The factorial ecological technique identifies underlying dimensions of ecological structure and the changing pattern of this structure using a number of variables. The analysis of ecological structure and change considers social aspects of physical space and it uses a number of dimensions to help identify this sociospatial relationship.

In sociological studies, social structure has been analyzed from a variety of approaches (see Blau 1977 ; Rubinstein 1986). The ecological approach is one of these and one whose primary concern is with conceptualizing and interpreting social structure and change in spatial terms. Recently, sociologists have become interested in inquiring into the spatial dimensions of social structure, with spatial structure being seen not merely as an arena in which social life unfolds, but as a medium through which social relations are produced and reproduced (see Williams 1978 ; Giddens 1981 ; Urry 1985). Thus, ecological analysis is not simply an investigation of spatial structure per se. It may also be related to various elements of social organization, such as the division of labour, land use patterns, racial cohesion and viability in a multiracial country, and so forth.

Factorial ecological studies have been done mostly on a single city base, with a factorial analysis of the ecological structure at a national level being rare. Moreover, factorial studies of ecological structural change have also been few and those which have been undertaken have been of single cities only. However, this study includes the analysis of ecological structure and change at a national level.

2 . The Concept of Ecological Structure

The primary concern of social ecology is with the spatial distribution of interrelated social variables. Empirically, theories of social ecology have shed light on the spatial organization of cities rather than on society as a whole. They are based on an assumption that the distribution of demographic, economic, and social phenomena within a city follow regular, recurrent, and predictable patterns (Poplin 1972). However, social ecology has not developed a single coherent perspective, but rather a number of different approaches, namely, classical social ecology, neo-orthodox social ecology, sociocultural ecology, and social area analysis. Factorial ecology, the focus of this thesis, which uses a factor analytical technique, is also a field of social ecology. As outlined below, the concept of ecological structure has varied with the schools of social ecology and even with the students in the same school.

Classical social ecology is represented by R.E. Park, R. D. McKenzie, and E.W. Burgess. They did not use the term "ecological structure", but their work was based on a notion of ecological structure, seeking an explanation for the spatial pattern of a city.

Park's (1925) idea of ecological structure was expressed by the term "ecological organization", which was defined as the distribution of population and institutions in some characteristic pattern. This would mean that, for Park, ecological organization represents ecological structure, and that population and institutions are the basic components of this structure. Population was regarded as an aggregate of individuals, whereas institutions referred to homes, churches, schools, playgrounds, and business and industrial enterprises of some sort.

McKenzie (1925) argued that social ecology is a study of the spatial groupings of interacting human beings or of interrelated human institutions within a given community. For him (1926), the spatial grouping represented ecological distribution, with human beings and human institutions being ecological units constituting the ecological distribution. It follows, then, that his idea of ecological structure is expressed by ecological distribution, and ecological structural component by ecological unit. For McKenzie (1926), people are socially meaningful as social actors not as individuals, and human institutions were unitary units such as shops, offices, industrial plants, etc.

Burgess conducted empirical research on a city rather than theorizing about social

ecology. He (1925) formulated the hypothesis that cities develop as a series of concentric zones located around the core zone of the central business district. Although Burgess did not discuss the concept "ecological structure", it seems obvious that the spatially distributed pattern of concentric zones was understood either as an urban growth pattern or as an ecological structure of the city.

The first major innovation in social ecological theory was pioneered by J.A. Quinn and A.H. Hawley and is often referred to as neo-orthodox ecology. They were basically in sympathy with the goals and purposes of classical ecologists, but sought to correct the deficiencies in classical ecological theory rather than to replace it with some other theoretical scheme.

Quinn (1950) declared that ecological structure denotes those aspects of the spatial-functional structure of an area that arise through the operation of ecological processes. His conception of ecological structure, therefore, referred to two different but interrelated phenomena: the functional division of labour found at community level and the spatial organization of the community. This means that, for Quinn, the spatial structure suggested by classical social ecologists is merely one dimension of ecological structure, because they did not include the facet of functional relationships. Quinn (1950) cited three possible units as the components of ecological structure. The three are a single living organism, a group that produces or consumes as a unit, or any specialized function such as a store or factory.

Hawley's conception of ecological structure begins with discussion of ecological organization, which was defined as a complex of functional relationships by which people live (Hawley 1950). He explained the nature of ecological organization in terms of three aspects: differentiation, community structure, and spatial structure. This may mean that his term, "ecological organization", is a synonym for ecological structure, since it covers differentiation, community structure, and spatial structure. His analytical approach to ecological structure covers the spatial distribution of and functional relationships between ecological structural components. He cited individual and communal units as the basic components of ecological organization, with the following conceptions (Hawley 1950): the individual is not a biological organism but a social being who conceives of collective life not as an attribute of individuals but as a property of the aggregate; communal units are congeries of corporate and categoric groups performing one or more institutional functions.

A leading proponent of sociocultural ecology was W. Firey. He (1945) took a position that space may have a symbolic value and should not always be regarded as having only cost-imposing qualities: space takes on meaning for people through cultural definitions, and at every point cultural values intervene between the physical environment and the human community. Firey did not discuss the concept of ecological structure. However, he (1947) held the view that land use pattern reflects the ecological structure, maintaining that the variability of spatial patterns is molded by land uses. He suggested two forces as the determinants of urban land use — "rational adaptation" and "sentiment and symbolism" (Firey 1945).

Another interesting example of the role sociocultural variables plays in influencing the configuration of urban ecological structure can be observed from studies of particular urban areas or ethnic groups. These studies usually brought out the importance of culturally-rooted values in shaping urban ecological structure (e.g. Seeman 1938 ; Jonassen 1949 ; Myers 1950 ; Kosa 1956).

As a consequence, sociocultural ecologists viewed the pattern of urban land use as an ecological structure, and they cited social and cultural variables as the chief determinants of urban ecological structure. Such a frame of reference was designed to avoid the determinism (economic or biological) that was inherent in the classical and neo-orthodox ecology (Bailey and Mulcahy 1972).

Since the early 1950s, social ecologists have all but abandoned their broad theoretical and empirical studies of ecological structure. One of these approaches is known as social area analysis, which was concerned only with patterns of differentiation and stratification as they were manifested in urban areas. The approach was first discussed by E. Shevky and M. Williams and was elaborated by E. Shevky and W. Bell. The latter two (1955) viewed social area as containing persons with similar social positions in the larger society. On the basis of this premise, they derived three key variables in order to identify urban census collector's districts whose populations were similar. The three were (Shevky and Williams 1949) : social rank, urbanization, and segregation.

Tryon's (1955) study represented another attempt to classify people — or areas — into sub-cultural groups as an urban spatial structure. From a cluster analysis of 33 variables, he formed three independent dimensions of social areas — family life, socio-economic independence, and assimilation. In contrast, Buttimer (1968) preferred the

term "social space", defining it in such a way that both subjective and objective dimensions are included. She argued that social space is made up of three major ingredients: formal characteristics (summarized spatially as areas and obtained by mapping socio-economic criteria), functional characteristics (summarized spatially as points which serve as major foci of social activity), and circulatory characteristics (summarized spatially as lines representing the flows of goods, services, people and ideas and including space perceived by individual and specific group).

Although social area analysts did not discuss the concept of ecological structure, it seems obvious that they would have identified it with the spatial distribution of social area, that is, the spatial distribution of homogeneous population groupings in urban settings.

The term "factorial ecology" was first introduced in the 1960s. Factorial ecology is to identify ecological structure and change on the basis of the spatial distribution of social variables, using a factor analytic technique. Factorial ecologists (e. g. Jonassen 1961; Sweetser 1965; Jones 1965; Murdie 1969; Janson 1971; Haynes 1971; Ayeni 1979) do not argue about the concept of ecological structure. Instead, they include whatever census data are available, identify and specify factor structures, and then define them as the dimensions of ecological structure.

Conceptual and empirical issues surrounding ecological structure in social ecology which have been reviewed here reveal that social ecologists have not developed a single coherent framework of ecological structure with regard to the concept. Different positions havn been taken in terms of connoting ecological structure, the conceptual definition of the term, the basic components of ecological structure, and the analytic dimensions. However, it is evident, firstly, that all agree that the analysis of ecological structure should be undertaken in terms of spatial distribution. Some students like Quinn, Hawley, and Buttimer extend the analysis to the functional relationships among the components of ecological structure. Secondly, different components of ecological structure have been cited by different students, even if some students did not cite the components specifically (e.g. Burgess; Firey), with these components, sometimes, being specified as ecological units. These components are the basic dimensions of ecological structure.

In examining the conceptual meanings of these components of ecological structure, some categories are found to be common to all. For example, Park's "population",

McKenzie's "human beings", Quinn's "group", and Hawley's "individuals as aggregate" fall into the category of aggregate profiles of individuals in terms of demographic or socio-economic profiles. Buttimer's "formal characteristics" also fall into this category, because it was interpreted as being characterized by socio-economic aspects of inhabitants. Thus, this category represents "population as an aggregate of individuals." But, Quinn's "single living organism" is denoted as an individual profile.

On the other hand, Park's "institution", McKenzie's "human institution", Quinn's "specialized function", and Hawley's "communal unit" referred to functional units such as schools, shops, churches, businesses and industrial enterprises, etc. It is obvious that these functional units include economic, administrative, political, religious, and educational activity, etc. Buttimer's "functional characteristics" may also fall into this category, because she defined it as the social activities of social groups. However, Buttimer's "circulatory characteristics" are no more than an internal mechanism of such functional activities, being summarized as the flows of goods, services, people and ideas. Therefore, "social activities being performed by such functional units" may be cited as another basic component of ecological structure.

In contrast, social area analysts and factorial ecologists did not claim the theoretical definition of ecological structure and its components. They simply follow previous social ecologists in that ecological structure should be investigated in terms of spatial distribution, extracting newly named structural dimensions from a number of empirical variables representing the two basic components — population and social activities.

In summary, the basic components of ecological structure are "population", defined as an aggregate of individuals and "social activities", defined as achieves by functional units. The former is referred to as the aggregate profile of individuals, while the latter includes economic, administrative, political, educational, religious activities, and so on. The study of ecological structure should involve investigation of the spatial differentiation of the components of ecological structure and may be extended to the analysis of the functional relationships among the components.

3. Methodology

3.1: The Unit of Analysis

Factorial ecology uses the census collector's district as the basic unit of analysis.

Some debate has arisen with regard to use of the areal unit as a unit of analysis. The debate relates essentially to aggregate data which arise the problems of ecological fallacy and spatial autocorrelation (see Robinson 1950 ; Menzel 1950 ; Alker 1969 ; Hammond 1973 ; Openshaw 1984 ; Bahrenberg 1984 ; Johnston 1984). The main issue of this debate is that each of the bounded areal units should not deviate in homogeneity in order for the problems to be eliminated.

Much effort has been devoted to the investigation of the internal homogeneity of areal units being used in social ecology (see Cowgill and Cowgill 1951 ; Myers 1954 ; Sweetser 1971 ; Newton and Johnston 1976 ; Charnock 1982). However, the question as to the degree to which heterogeneity is to be tolerated has never been posed in a way that would allow an objective solution. No effort has been expended in devising systems of areal units in which the units are thought to be homogeneous. The eriteria for adjudging a suitable degree of homogeneity have also not been elaborated. Also, no factorial ecological analyses have identified alternative areal units whose homogeneity is ensured.

Considering these issues and the general use in factorial ecological studies, this study used the census collector's district as the unit of analysis. In Korea, cities and counties are the principal census units ; they are also socially and economically integrated territorial units. The number of cities and counties differed between 1970 and 1980 and this change occurred following adjustments in administrative districts after 1970. In ecological analysis, as Hoiberg and Cloyd (1971) have indicated, change in the boundaries of census collector's districts creates problems of comparability. In order to solve this problem, areas in 1980 were adjusted according to their 1970 boundaries. Thus, the final number of areal units of analysis are 172, the 32 cities and 140 counties existing in 1970.

3.2 : Selection of Variables and Operational Definitions

The two basic components of ecological structure — "population" as an aggregate of individuals and "social activities" performed by various functional units — should be the basis for selecting empirical variables for this study. They should not be redundant (Janson 1969). The problem of redundancy arises most often when variables contain any sub-classes of another variable, or when variables with the same or almost the same denominator and numerators from different but actually closely related

classifications are selected. In case of comparative analysis, like this study, an identical set of variables should be selected over two points in time and between areal units. Furthermore, a satisfactory variable should be quantitatively expressed and be comparable and applicable to areas of different size and type.

In factorial ecology, however, many empirical variables do not conform to these standards. The practical reason for this is the availability of data. The technical reason is that since all variables are construed to be dependent with no clear predictor variables, they can not be precisely evaluated. Under such conditions, an identical set of 40 variables, corresponding to the conceptual meaning of the two basic components of ecological structure, was selected from the 1970 and 1980 Censuses of Korea for each of the 172 areal units (see Table 1). All variables were measured as percentage, mean, or rate in order to remove the effect of areal size.

〈 **Table 1** 〉 **List of Variables Used in Analysis**

No.	Names	Operational Definitions
		Ⅰ. Population Size and Structure
1	Density	Average number of persons per square km.
2	Population Change	% change over the previous 5 years (1).
3	Crude Birth Ratio	Number of births per 1,000 population.
4	Crude Death Ratio	Number of deaths per 1,000 population.
5	Family Size	Average number of family members per household.
		Ⅱ. Living Conditions
6	Home Ownership	% of households owning dwelling.
7	Dwelling Space	Average housing space in square metres per person.
8	Possession of Car	Number of cars per 1,000 population.
9	Distribution of TV Sets	Number of TV sets per 1,000 population.
10	Distribution of Home Telephone	Number of home telephones per 1,000 population.
11	Supply of Running Water	% of households supplied with running water.
12	Paved Roads	% of roads paved.

(Table 1 — Continued)

No.	Name	Operational Definitions
		Ⅲ. Economic Activity
13	Primary Industry	% of households engaged in farm, forestry, or fishery industry.
14	Cultivated Land Size	Average size of agricultural land in hectares per farming household.
15	Banks	Number of banks per 1,000 population.
16	Deposits	Average daily bank deposits per person in Won.
17	Loans	Average daily bank loans per person in Won.
18	Commercial Activity	Number of wholesale and retail establishments per 1,000 population.
19	Manufacturing industry	Number of manufacturing industries per 1,000 population.
20	Local Tax	Average yearly local tax burden per person in Won.
21	Food Services	Number of restaurants, tea houses, and entertainment bars per 1,000 population.
22	Accommodation businesses	Number of places of accommodation, such as hotels and inns per 1,000 population.
		Ⅳ. Educational Activity
23	Educational Institutions	Number of educational establishments per 1,000 population.
24	High School & University Enrolment	Number of students from secondary school through university per 1,000 population.
25	Libraries	Number of books in private and public libraries per 1,000 population.
		Ⅴ. Administrative and Political Activity
26	Public Servants	Number of civil servants employed in clerical administration in national or local government per 1,000 population.
27	Crime	% of arrests for criminal offenses.
28	Mail	Average number of letters handled per person during a year.
29	Political Participation	Level of voting at general elections (2).

(Table 1 — Continued)

No.	Names	Operational Definitions
		Ⅵ. Religious Activity
30	Religious Institutions	Number of churches, cathedrals, and temples per 1,000 population
31	Religious Belief	% of Christians and Buddhists in the total population.
		Ⅶ. Health and Social Welfare Activity
32	Pharmacists	Number of pharmacists per 1,000 population.
33	Physicians	Number of physicians per 1,000 population.
34	Medical Centres	Number of hospitals, clinics, and health centres per 1,000 population.
35	Personal Services	Number of public baths, barber shops, and beauty shops per 1,000 population.
36	Recreation Facilites	Number of table tennis, billiard, and dance halls per 1,000 population.
37	Public Performance Facilities	Number of theatres and drama centres per 1,000 population.
38	Family Planning	% of people who have been sterilized or are loop users by total households.
39	Public Welfare	Number of homes for the aged, centres for physically handicapped children, orphanages, and day care centres per 1,000 population.
40	Social Relief	Number of households on government subsistence per 1,000 households.

NOTE : (1) 1965 ~ 1970 was the period used for the 1970 data and 1975 ~ 1980 for the 1980 data.

(2) The voting rate of the 7th presidential election in 1971 was used for 1970 data, and that of the 11th assemblyman election in 1981 for 1980 data.

3.3 : The Analysis of Ecological Structural Change

Ecological structural change may be approached in two ways. One is a comparison between the two structures after separate analyses have been undertaken. The other way is to derive a pattern of change, using a new set of data created from the value of change in each corresponding variable between two points in time. The former is a cross-sectional analysis and is defined as "change in ecological structure", while the latter is a longitudinal analysis and is defined as "the structure of ecological change". This study will include both approaches. For the longitudinal analysis, change coefficients were created for each of the 40 identical variables within each areal unit, using the following formula.

$$Cij = \frac{Pij\ (1980) - Pij\ (1970)}{Pij\ (1970)} \times 100$$

Where : Pij (1970) indicates the value for analytical unit "i" on variable "j" in 1970.

Pij (1980) indicates the value for analytical unit "i" on variable "j" in 1980.

Cij indicates the change coefficient for variable "i" in analytical unit "j" from 1970 to 1980.

3.4 : The Transformation of Variables to Normality

Factorial ecology requires that variables should be measured at interval scale levels (Janson 1969) and should be linearly related to one another and normally distributed (Rummel 1970 ; Child 1979). All the variables in this study were measured at an interval scale level. Normality and linearity are interrelated. Bivariate normality has the useful property that the relationship between two variables is linear (Rummel 1970). Univariate distribution is not sufficient for bivariate distribution to be normal, but it increases the likelihood (Rummel 1970). This is why any variables which deviate extremely from univariate normality may be technically unsuitable for inclusion in factor analysis, unless they are transformed to as near univariate normality as possible.

Transformation may be applied either to each variable or to the whole data matrix itself. The former approach is called distributional transformation, and the latter, matrix transformation. This study employed the former. Among alternatives for the test of normality, one method, which may be the simplest, is to determine skewness and kurtosis. The transformed version does not always guarantee normality, but does improve the normality. There is little work available on the effects of large skewness and kurtosis within factor analysis in general. Rather, the decision as to what level of normality is unacceptable must be an arbitrary one (Sweetser 1974). To date, it is an open question whether normalizing is advisable or not, with the effect of non-linear relationships appearing be entirely unexplored.

Keeping those aspects in mind, this study checked the variables with a skewness of 3,000 or higher in absolute value. The variables whose skewness was 3,000 or over showed right-skewed distributions. For distributional transformation, logarithmic, square-root, or reciprocal transformation can be applied to right-skewed distributions (Rummel 1970). This study selected logarithmic and square-root transformations. The final version of each variables was selected among the original, logarithmic, and square-root transformation on the basis of less skewness.

3.5 : Selection of the Factor Analytical Technique

This study used the principal-factor method, with use of eigenvalue-one criterion. Unrotated factors may or may not give a meaningful pattern of variables. However, even if the simple structure contains some conceptual and technical problems requiring solution (see Butler 1969 ; Curetonand Muliak 1971), rotation tends to make each factor define a distinct cluster of intercorrelated variables. Although the validity of orthogonal rotation has been questioned by some factorial ecologists (e.g. Johnston 1971 ; Rees 1971 ; Hunter 1972), it has been preferred for a mathematical elegance, relatively clear demarcations in the underlying domain of interest, and a reasonably simple geometry of factor scores (Perle 1977). Therefore, this study will employ orthogonal rotation.

There are two basic models which can be adopted in the factor analytical technique. They are known as factor analysis and principal-component analysis, with fundamental differences existing between the two methods. In this paper, however, the term, factor analytical technique is used to denote both techniques in a general sense.

Variables with a factor loading of 0.300 or higher in absolute value will be constructed as the composite variables for each factor. This is a rule of thumb method which can be used initially. There are two fundamentally different interpretation of factors, these being 'descriptive' and 'theoretical' (or 'causal') (see Rummel 1970; Chojnicki and Czyz 1976). This study will use the former, the main reason being that the theoretical interpretation is plagued with problems, these mainly being in terms of the causal connections between factors and the initial variables (Chojnicki and Czyz 1976).

Finally, factor scores will be estimated for each areal unit on each factor. This is for measuring spatial pattern and homogeneous area groupings. A number of techniques have been developed to estimate factor scores (for details, see Harris 1967; Rummel 1970; Tucker 1971; Wackwitz and Horn 1971; Harman 1976). However, it is possible to find a system for which several of the schemes yield proportional results and thus no choice may be required (Harris 1967). Therefore, this study will estimate factor scores by multiplying the standardized value of a variable by the variable's factor-score coefficient, the latter being derived from the regression estimate method.

3.6 : The Scope of Study

As discussed earlier, the study of ecological structure and/or change should involve investigation of spatial differentiation and may be extended to the analysis of the functional relationships. However, this study of the factorial ecology of South Korea will cover spatial differentiation only. The main reason for this is associated with technical problems inherent in the factor analytical technique, which are as follows.

From a statistical point of view, the relationships among the factors, even if they are not functional ones, may be inspected in terms of the strength of correlations where the factors are extracted from oblique rotation (Janson 1980). On the other hand, if there are selected dependent variables, the relationships may be traced through an additional regression analysis using the factors as independent variables (e.g. Clark 1972). However, even where oblique rotation is employed, significant correlations are used not as the relationships among factors, but rather as a rationale for more general constructs formed through the merging of lower-order factors (Rummel 1970). This is to identify and specify more meaningful factors as components of ecological structure or change (e.g. Perle 1977).

4. The Ecological Structure of Korea in 1970

4.1 The Dimensions of Ecological Structure

As the first stage of analysis, product-moment correlations were obtained for the set of 40 variables. As the main part of the analysis, factorization of the 40 variables was done by the principal-factor solution with the eigenvalue-one criterion. Five factors appeared as the highest advisable number of dimensions with which the Korean ecological structure can best be described in 1970. They were rotated to orthogonality according to the varimax criterion.

The examination of congruence-coefficients and simple structure revealed that although the varimax rotation did not bring about a much better result as had been hoped, the result was relatively more acceptable than the unrotated set. Thus, the varimax rotated set was finally chosen.

The five dimensions in the varimax rotated set (see Table 2.1 in the Appendix) explain a total of 60.1 % of the variance. The first dimension accounts for 36.1 % of this explained variance, while the other four dimensions account for 8.5 %, 6.4 %, 5.3 %, and 3.8 % respectively. Each of the five dimensions can now be discussed.

4.2 : Description of Structural Dimensions

Factor I accounts for 36.1 % of the total variance. 33 variables have loadings numerically greater than 0.300 in absolute value. The variables reflect an urban socio-economic, cultural, and demographic profile, and the living conditions prevailing in urban areas.

In regard to the urban socio-economic profiles, this dimension is strongly associated at a negative level with "Primary Industry". There is also a negative association with "Cultivated Land Size". Such a profile is also supported by a positive loading on "Manufacturing Industry". "Distribution of Home Telephone", "Possession of Car", "Distribution of TV Sets", and "Recreation Facilities", all of which relate to cultural issues, are positively weighted on this dimension. The variables tied to urban demographic characteristics are "Density" and "Population Change" in a positive way. The weights for "Crude Birth Ratio", "Crude Death Ratio", and "Family Size" are

negative. However, "Family Planning" is positively loaded. As to the variables reflecting urban living conditions, "Home Ownership" and "Dwelling Space" have a negative loading. Instead, there are positive-weighted indicators on urban health and welfare facilities. These are "Physicians", "Medical Centres", "Personal Services", "Public Welfare", "Pharmacists", "Supply of Running Water", and "Paved Roads". Thus, it is in this way that this dimension can be termed "Urbanism".

Factor Ⅱ accounts for 8.5% of the total variance. 15 variables are loaded on it. All but one are the variables loaded significantly on Factor I, with "Social Relief" being the exception. The variables are those tied to small familly size. To be specific, "Family Planning" is associated at the heaviest loading in a positive way. This level of loading is followed by "Crude Birth Ratio" and "Crude Death Ratio", but in a negative association. Other variables reflect an urban socio-economic structural profile and the prosperous conditions associated with cities. Thus, "Urban Familism" seems the best term for this dimension. However, as identified earlier, all but one of the variables are loaded on Factor I and in this sense, this dimension may be seen a sub-dimension of Urbanism.

Factor Ⅲ explains 6.4% of the total variance. 4 variables are loaded. They are "Religious Belief", "Religious Institutions", "Dwelling Space", and "Cultivated Land Size". The first two are independent of any other factors, while the latter two are concomitantly loaded on other factors. The 4 variables are all loaded positively on this dimension. At the top of the loading is the high positive weighting for "Religious Belief". "Religious Institutions" is ranked second. In this sense the dimension is termed "Religiosity".

Factor Ⅳ accounts for 5.3% of the total variance. It has 8 significant variables, but, only three of them — "Public Servants", "Mail", and "Political Participation" — are loaded uniquely. "Political Participation" is at the top in a positive way. In Korea, the level of voting has been significantly dependent on the political role played by public servants. The strong relationship between political mobilization and public servants is also supported in this study by the positive loading on "Public Servants". Other variables have a low positive loading and are at least partly those reflecting a result of government-involved activities. Thus, this dimension is termed "State Intervention".

Factor Ⅴ accounts for 3.8% of the total variance. 5 variables have significant

loadings. Of them, "Cultivated Land Size" is loaded with the heaviest negative weighting, suggesting that this dimension reflects a non-agricultural structural profile. The positive loadings of "Pharmacists" and "Libraries" may be a reflection of healthy and cultural opportunities. "Supply of Running Water" can be used as quite a good indicator of welfare. The positive weighting on "Distribution of Home Telephone" may also reflect a high standard of living. These characteristics tend to describe a non-agricultural structural profile with a high standard of social welfare or living conditions. In this connection, "Social Benefits" seems the best term to use for this dimension. As with Factor Ⅱ, the structural profile of this dimension is also included in Factor Ⅰ.

4.3 : The Spatial Patterning of Structural Dimensions

1) Individual Structural Dimensions

Factor scores were estimated for the 172 areas on each dimension of the 1970 ecological structure. Their correlation coefficients were reviewed. They constitute a rough indicator of the relationship in terms of spatial differentiation on a nationwide scale. It was found that Urbanism, Urban Familism, and Social Benefits are significantly correlated with each other in their spatial differentiation in a positive way. Urban Familism and Social Benefits tend to go significantly with Religiosity and State Intervention in a moderately negative way, while Urbanism is not related to the two latter dimensions at all. In contrast, State Intervention and Religiosity are significantly correlated with each other in moderately positive way.

In traditional urban factorial ecology several attempts have been made to measure quantitatively the spatial patterning of ecological structure, using factor scores. These include use of graphs on which scores are measured outwards along major radials, analysis of variances, and centrographic techniques (see Anderson and Egeland 1961 ; McElrath 1962 ; Murdie 1969 ; Haynes 1971 ; Timms 1971). These can not be applied to national level. For the theoretical reason, a central area can not be identified in nationwide research.

In this study, therefore, spatial patterning was examined in terms of surface configuration based on the degree of concentration of factor scores. For this purpose, the factor scores of each structural dimension were divided into six classes ranging from

highly positive to highly negative, using an interval of 0.5 standard deviations from its mean score.

Urbanism was highly concentrated on the districts adjacent to Seoul and in the northern and southern districts of Kangwon. Kyeongnam and Cheonnam were far less Urbanized. The spatial differentiation of Urbanism was characterized by a marked north-south patterning, with the northern area being more urbanized. All cities were identifiable as being highly urbanized. With a few exceptions, rural areas were not urbanized. Urbanized rural areas were mostly those contiguous to Seoul, or those mostly with manufacturing industries established since 1962 when the first Five-Year Economic Development Plan was launched. Another interesting spatial patterning was the way rural areas contiguous to urban areas, with the exception of those around Seoul, were rather less urbanized than other rural areas. This indicates that, with exception of the areas around Seoul, local urban areas are not expanding into their contiguous peripheral rural areas.

The spatial patterning of Urban Familism generally followed that of Urbanism. That is, highly urbanized areas tended to show high Urban Familism, while in contrast, those areas which score highly on Urban Familism and have low Urbanism (or vice versa) were mostly the rural areas of southern Kyeongnam. At a national level, Urban Familism was highly concentrated on the districts of western Kyeonggi and western Kyeongnam.

Rural areas, regardless of where they are located, had higher Religiosity. The general trend found was that the less the concentration of Urbanism and/or Urban Familism, the higher the concentration of Religiosity. The rural areas of low Religiosity were mostly those from Chungnam, western Kyeongnam, and eastern Kangwon. Another significant patterning was that the rural areas adjacent to urban areas tend towards a lower concentration of Religiosity than other rural areas. Moreover, on a national level, Religiosity was concentrated on inland rather than on coastal areas.

State Intervention was highly concentrated on Cheju, Kangwon, and eastern Kyeonggi. Kyeongpuk and Kyeongnam had a moderate concentration of State Intervention with a fairly even differentiation among their sub-areas, particularly with the eastern rural areas of Cheonpuk being low. Chungnam and Cheonpuk were remarkably low in State Intervention. As a result, State Intervention was spatially distributed by an east-west distinction at a national level, in the way that it is highly concentrated on eastern regions.

State Intervention, like Religiosity, was also a rural-centred dimension.

Social Benefits showed an urban-centred spatial patterning. On a national level, the southern and eastern districts of Kyeongnam had the highest concentration. These areas comprised local cities within Kyeongnam and rural areas around Pusan. In contrast, Chungpuk, Chungnam, and Kangwon were the less concentrated regions.

These findings lead to the conclusion that there is a distinct spatial patterning to each of the five ecological structural dimensions. The distinctions are significant by province, as well as by urban-rural contrast. However, the distinctions are dominated by an urban- or rural-centred patterning rather than by a regional (i.e. provincial)-centred one. This would mean that urban areas tend to be similar rather than different in their ecological structural profile, even if not identical. The same is true of the trend among rural areas.

2) Total Ecological Structure

When the dimensions are scaled into factor scores, a further step may be taken to produce a single dimension of ecological structure, combining the evidences of all the dimensions extracted. The single dimension will express the overall status of the area's ecological structure; in this sense, the single dimension may be defined as the profile of the total ecological structure. The theoretical reference of the total ecological structure is based on the fact that the final aspect of ecological structure should be understood as a whole system constituting various sub-systems, or more precisely, a morphology of a resulting system whose component parts are totally integrated.

Various techniques may be applied to this investigation using the factor scores (see Jones 1965; Rummel 1970; Robson 1971; D'sa 1986). Their general principle is to maximize within-group homogeneity and between-group heterogeneity on the basis of a single estimate of closeness, regarding each dimension as a new composite variable. However, there is no agreed definition of, or theoretical basis for, a general technique.

Thus, this study selected the cross-classification method. This method has been based either on a combination of two coordinate dimensions, a horizontal and a vertical axis (see Jones 1965), or on an application of several cutting points to each set of dimensional scores to delineate homogeneous and heterogeneous areal groups (see Robson 1971). The former can include only two structural dimensions, while the latter produces too many categories of total ecological structure. Thus, a modification was

attempted in such a way that all dimensions could be cross-classified together with the use of two cutting points only, higher or lower from the mean of each factor score.

The modified cross-classification produces 32 profiles of total ecological structure when the five dimension in this study are all included using the two cutting points. This produces a too detailed classification for the 172 areas in that, on average, only five or six areas will be allocated to each profile. Therefore, Urban Familism and Social Benefits were excluded from the framework. The reason for this is that, as identified earlier, the two dimensions could be interpreted as sub-dimensions of Urbanism.

Eight profiles of total ecological structure are then produced from the selected three dimensions — Urbanism, Religiosity, and State Intervention. A counter-term which describes an opposite structural profile was applied to each dimension for factor scores lower than the mean. They were Ruralism, Materialism, and Private Responsibility, versus Urbanism, Religiosity, and State Intervention, respectively. A new term has again been assigned to each of the eight profiles on the basis of the combination of the three structural profiles included. In assigning the new term, emphasis was given to Urbanism, because it is the strongest dimension in this study. In addition, Urbanism, Materialism, and Private Responsibility were interpreted as urban profiles, while their opposite profiles were defined as traditional (rural) ones.

The following diagram presents the detailed classification of the total ecological structural profile which resulted.

	Urbanism		Ruralism	
	Materialism	Religiosity	Materialism	Religiosity
Private Responsibility	Full Urbanism	Transitional Urbanism	Approaching Urbanism	Transitional Ruralism
State Intervention	Transitional Urbanism	Rurbanism	Transitional Ruralism	Traditional Ruralism

As expected, Full Urbanism was a very definite metropolitan-oriented pattern. Transitional Urbanism was spatially clustered in small and medium-sized cities, in the big rural counties of Kangwon and in the industrializing rural areas, particularly

those contiguous to Seoul. Rurbanism was spatially concentrated in the northern districts of Kangwon and Kyeonggi and was evident in the rural areas contiguous to the areas of Transitional Urbanism. As a consequence, Full Urbanism, Transitional Urbanism, and Rurbanism were spatially patterned in areas contiguous to each other and were dominantly clustered in the northern part of Kyeonggi, in the northern and southern areas of Kangwon, and in Cheju.

The remaining three dimensions were all spatially oriented in rural areas with a very different spatial patterning. Approaching Urbanism is dominant in Chungnam, Cheonnam, and the western and eastern areas of Kyeongnam. Transitional Ruralism was distinctively clustered in Cheonpuk, the inland of Kyeongnam, and the southern areas of Cheonpuk. Traditional Ruralism was highly clustered in the westerm areas of Kangwon, the southern Kyeonggi, and most rural areas of Kyeongpuk. Such a spatial patterning of the total ecological structural profile was likely to be more distinctive than that of the individual structural dimensions in terms of clustering pattern by the profiles in space at the national level.

5. The Ecological Structure of Korea in 1980

5.1: The Dimensions of Ecological Structure

The same type of analysis used for the 1970 ecological structure was employed for the 1980 analysis. Five factors were produced as the highest advisable number of dimensions with which the 1980 ecological structure could best be described.

The examination of congruence-coefficients and simple structure identified that the varimax rotated set is more acceptable. The five dimensions in the varimax rotated set (see Table 2.2 in the Appendix) explain a total of 58.9% of the variance. The first dimension accounts for 24.5%, while the other four account for 15.6%, 7.1%, 6.8%, and 4.9% respectively.

Congruence-coefficients between the 1970 and 1980 varimax-rotated dimensions were further reviewed. They revealed a remarkable similarity, as is explained in the following section.

5.2: Description of Structural Dimensions

Factor I has 29 significant variables. They are almost the same as those in the 1970 Urbanism. The remarkable similar structure was also confirmed by the congruence-coefficient between the two factors (0.958). Thus, this dimension is termed "Urbanism".

24 variables are loaded significantly on Factor II. Of them, four variables are independent of any other factors. They are "Manufacturing Industry", "Local Tax", "Educational Institutions", and "Social Relief". The remaining variables are concomitantly loaded mostly on Factor I. The structure of this dimension showed a high congruence with Urbanism (0.855) and Urban Familism (0.803) in 1970. In this sense, this dimension could, of course, be termed urbanism or urban familism. However, considering the top five leading variables and the four independent variables, this dimension is characterized by a structural profile of industrialism. In detail, this dimension has a high positive association with "Population Change" and "Manufacturing Industry", and a high negative association with "Primary Industry". These are important basic indicators of industrialization. It may thus be said that basically this dimension reflects a structural profile of "Industrialism".

On Factor III, 7 variables are loaded significantly. Of them, 5 are the same as those of the 1970 Factor III. The similarity in the structure between the two factors was also supported by the high congruence-coefficient (0.841). In this connection, this dimension is called "Religiosity".

On Factor Ⅳ, 9 variables are loaded significantly. Of them, "Crude Birth Ratio", "Family Planning", and "Crude Death Ratio", have the heaviest loadings, reflecting the main part of the structural profile. These three variables are indicators of small family size and are the same as those of the 1970 Factor Urban Familism. Also, this the two factors showed a high congruence (0.767) and thus, this factor is termed "Urban Familism".

Factor V has 4 significant variables: "Political Participation", "Family Size", "Public Servants", and "Supply of Running Water". Of them, the three most significant variables and their signs of loading are the same as those of the 1970 State Intervention, with a high congruence-coefficient (0.766). The remaining variable,

"Supply of Running Water", is interpreted as a government-led public activity for improving living conditions. In this way, this dimension is termed "State Intervention".

5.3 : The Spatial Patterning of Structural Dimensions

1) Individual Structural Dimensions

The factor scores estimated for the 172 areas on each structural dimension illustrated that Urbanism, Industrialism, and Urban Familism are significantly correlated with each other in a positive association in regards to the spatial differentiation over the 172 areas. The strongest association was found between Industrialism and Urban Familism, followed by the correlations between Urbanism and Urban Familism and between Urbanism and Industrialism. On the other hand, the spatial differentiation of Urbanism was significantly associated with that of Religiosity in a negative way, but not significant with the spatial distribution of State Intervention. Interestingly, unlike Urbanism, Urban Familism and Industrialism were not significantly associated with Religiosity and State Intervention. However, as in the 1970 analysis, Religiosity and State Intervention showed a positive association of spatial differentiation.

The factor scores of each structural dimension were classified into six classes ranging from high positive to negative, with use of an interval of 0.5 standard deviations from its mean score. Each class can be, then, claimed to be homogeneous in terms of structural profile.

Urbanism was an urban-centred dimension in the spatial cluster and all cities were identifiable as highly urbanized. A moderate level of Urbanism was found among mostly the rural areas of Kyeongpuk. On the national level, Urbanism was spatially concentrated in the east of Kyeongnam and in the west and south of Kyeongpuk.

Industrialism also showed an urban-centred distribution. All cities were identifiable as industrialized. Most cities showed high Industrialism together with high Urbanism. In contrast, some urban areas were identified as highly industrialized, but have a relatively low level of Urbanism, or often were less industrialized but

with high Urbanism. A similar trend was also identified among rural areas. For example, some rural areas, in particular those adjacent to Seoul, were highly industrialized, but had low Urbanism. Another group of some rural areas in which industrial complexes were built during the 1970s had high Urbanism, but had a relatively low level of Industrialism. In terms of national level, Industrialism was highly clustered in the west of Kyeonggi and the southeast of Kyeongnam. Most rural areas of Kangwon, the east of Cheonpuk, and the west of Kyeongnam were identifiable as being less industrialized.

Religiosity showed a rural-centred differentiation. All cities showed low level of Religiosity. The rural areas of low Religiosity were mostly in Chungnam, the areas around Seoul, most areas in Cheonnam, and the western Kyeongnam. Particularly, the rural areas of low Religiosity around Seoul were those having high Urbanism and/or high Industrialism.

Urban Familism showed an urban-centred patterning. Rural areas of high Urban Familism were those mostly either urbanized or industrialized, or both. At a national level, Urban Familism showed a spatially patterned concentration in the northern rural areas of Kangwon, the areas adjacent to Seoul, most rural areas in Chungnam, and in the south of Kyeongnam. On the other hand, Chungpuk, Cheonpuk, Cheonnam, and Kyeongpuk were less concentrated areas of Urban Familism.

State Intervention was a characteristically rural-centred differentiation, although among urban areas. some metropolitan cities tended to have greater concentration of State Intervention than small and medium-sized cities. This is a reverse of the 1970 State Intervention trend, implying a significant increase of State Intervention in metropolitan cities during the 1970s. The rural areas of low State Intervention were mostly in Chungpuk, Chungnam, Cheonpuk, and Cheonnam. As a result, the northern and eastern regions enjoyed high State Intervention on a national level.

2) Total Ecological Structure

The same technique used for the creation of the 1970 total ecological structure was applied to the 1980 analysis. The result showed Full Urbanism consists mostly of metropolitan cities, and also some small and medium-sized cities, as well as some big rural areas mostly adjacent to metropolitan cities. Transitional Urbanism was mostly derived from small and medium-sized cities, but, in part, also from some metropolitan cities and from some rural areas of high Industrialism. The other four profiles of total ecological structure were all rural-oriented.

6. The Change in Ecological Structure

The change in ecological structure between 1970 and 1980 were approached from three aspects. These were "compositional Changes" which compare the factor structures, "changes in the status of individual areas in the structure" which compare the factor score on each area for each structural dimension, and "changes in the spatial patternings" of the structure at a national level. This is a cross-sectional approach.

The ecological structure of Korea was found to be remarkably stable over the decade in terms of compositional change. The important changes centred on the rise of Industrialism in 1980, the disappearance of Social Benefits, and a decline in the explanatory power of Urban Familism and State Intervention (see Tables 2.1 and 2.2 in the Appendix).

Most areas stayed in the same or similar spatial status between both years in terms of identical structural dimensions. Urban areas were relatively more stable than rural areas, with changing urban areas mostly being small cities, while changing rural areas were mostly those where new industrial complexes were established in the 1970s or those located around cities or near new industrial complexes. These resulted in a minor change in the spatial cluster of each structural dimensions in national geographic space.

These findings would imply that the change in ecological structure of Korea, even if minor, was characterized by a rural change. In addition, most changing areas were characterized by a change in the status of one structural dimension. By structural dimensions, Religiosity and State Intervention experienced a relatively higher level of change in the spatial patterning and such significant changes led some areas to change in the status of individual structural dimensions, but these were not strong enough to change the

profile of the total ecological structure.

7. The Structure of Ecological Change

7.1: The Dimensions of Ecological Change

The structure of ecological change addresses the relationships of differences in variables at two different points in time and is a longitudinal analysis. The major advantage of this approach is to offer a possibility of seeing the direct dimensions in change and changes in structural dimensions.

The set of 40 change coefficients produced a product-moment correlation matrix and were analyzed by the principal-factor method with the eigenvalue-one criterion. The analysis produced 7 eigenvalues over unity and they were rotated according to the varimax criterion. The examination of congruence-coefficients and simple structure revealed that the varimax rotated set was clearly preferred. However, Factors Ⅲ and Ⅴ had only two composite variables, with an extremely high loading (see Table 2.3 in the Appendix).

In factorial ecology, some factors are occasionally treated empirically or theoretically as uninterpretable, even if they are significant on the basis of the eigenvalue criterion (see Jones 1965; Sweetser 1974; Perle 1977; Elffers 1980). Factors Ⅲ and Ⅴ are one of the cases. Thus, another two sets of dimensions with 5 and 6 factors were fixed and rotated with a varimax criterion. Then, the three sets were examined in terms of congruence-coefficients, simple structure, factor structure, and conceptual meaning of each factor. These were to see whether Factors Ⅲ and Ⅴ are uninterpretable or meaningful. The results showed the seven-dimensional varimax rotated set, which was initially advised as having the highest number of dimensions, is the best descriptive structure of ecological change in Korea over 1970-1980.

The seven change dimensions (see Table 2.3 in the Appendix) explain a total of 38.6 % of the variance. The first dimension accounts for 10.4% of the explained variance, the second dimension 5.3%, the third dimension 5.1%, the fourth and the fifth dimension 4.8% each, the sixth dimension 4.2%, and the seventh dimension 3.9 %.

7.2 : Description of Change Dimensions

Factor I has 7 composite variables. They reflect rural attributes and also suggest an improvement in living standards and social services. Thus, "Rurbanization" seems an appropriate term for this dimension.

Five variables are loaded on Factor II, with a positive way. They represent an improvement in social and public services together with a high level of poverty and a traditional pattern of political participation. Thus, "Social Stagnation" seems the best term to describe this dimension.

Factor III has only two variables —"Deposits" and "Loans". They have extremely high loadings with a positive association and are independent of other factors. This would imply that the activity surrounding bank deposits and loans was a very important underlying element in ecological change of Korea during the 1970s. This may be related to special financial policies for promoting industrialization such as "private loan freeze" in 1972. Thus, this dimension may be termed "Expansion of Financial Activity".

8 variables are loaded on Factor IV, with all variables being positively associated. They reflect a growth in the quality of life, with the concept of quality of life entailing material and physical well-being and prosperity, as well as psychological well-being (see Gerson 1976). In this sense, "Improvements in the Quality of Life" seems to be the best term to describe this factor.

Factor V has only two composite variables — changes in "Family Planning" and "Crude Birth Ratio". The former has a high positive loading and is a strong indicator of a change towards the greater practice of birth control. The latter has a high negative loading, which may be a result of high acceptance of family planning. Thus, this dimension may be termed "Increase in Birth Control".

4 variables are loaded on Factor VI. The leading variables are "Religious Institutions" and "Religious Belief". This means that a high growth of religion in the 1970s is an underlying dimension of ecological change in Korea. Major reasons given for this were : the psychological effects and feelings of relative deprivation resulting from the process of rapid industrialization and tough political system (Rho 1985). In this way, this dimension is termed "Religious Growth".

Factor VII is identified to have 4 composite variables. The leading positive loading is on "Local Tax" and this indicates a growth in tax, possibly arising from an increase

in employment and/or wages. This is perhaps associated with Korea's rapid industrialization. The positive loading of "Manufacturing Industry" is a strong indicator of the industrialization. In contrast, the negative loading on "Mail" suggests a change in the nature of personal communication and the positive loading on "Physicians" reflects a development of welfare services, possibly emerging with the process of industrialization. Thus, "Industrialization" seems to be an appropriate label for this dimension.

7.3 : The Spatial Patterning of the Change Dimensions

1) Individual Change Dimensions

Factor scores were estimated for the 172 areas on each dimension of ecological change. Their significant spatial relationship was that Rurbanization tends to be positively related with Improvements in the Quality of Life and Religious Growth, but with industrialization not being significantly correlated with other dimensions. These patterns suggest that the spatial distributions of change dimensions are more independent of each other or are less compact than those of the 1970 and 1980 structural dimensions.

The scores of each change dimension were divided into six classes ranging from high positive to negative, using an interval of 0.5 standard deviations from its mean score. Areas belonging to the same class of each change dimension represent a similar structure of ecological change.

Rurbanization was a rural-centred change dimension. The rural areas of high Rurbanization were clustered in eastern Cheonpuk, almost all the rural areas of Cheonnam, and western Kyeongnam. The rural areas where the level of Urbanism, Urban Familism and/or Social Benefits was low in 1970 experienced a relatively high level of change to Rurbanization over the decade.

High levels of Social Stagnation were spatially clustered in three regions — Cheonpuk, Kyeongnam, and some rural areas around the demilitarized zone. They were mostly those characterized by low Urbanism in 1970 and this implies that some rural areas whose level of Urbanism was low in 1970 were still stagnant, with less development over the decade. By and large, the central regions showed a low level of Social Stagnation. This dimension was also rural-centred.

Expansion of Financial Activity showed a scattered spatial patterning at a national level. However, by province, this dimension was highly clustered in Cheonnam. This

dimension was also a rural-centred change. The areas of high Expansion of Financial Activity were mostly those of low Urbanism, low Urban Familism and/or low Social Benefits in 1970.

"Improvements in the Quality of Life" was spatially clustered in eastern and southern regions, being concentrated on western Cheonnam and almost all the rural areas of Kyeongpuk. This dimension was also a rural-centred one. Areas with marked Improvements in the Quality of Life coincided mostly with those of low Urbanism, low Urban Familism and/or low Social Benefits in 1970.

Increase in Birth Control was highly concentrated on western Kyeonggi, almost all the rural areas of Kangwon and Chungnam, western Kyeongpuk, and eastern Kyeongnam. This dimension was also a rural-centred one. High Increase in Birth Control occurred mostly in the areas of low Urban Familism, low Social Benefits and/or high State Intervention in 1970.

Religious Growth was characterized by a high cluster in almost all the rural areas of Kangwon, western Kyeongnam, and northeastern Cheonnam. They were mostly those of low Religiosity and/or of high State Intervention in 1970. This dimension was also rural-centred.

Industrialization showed a multi-nodal spatial patterning at a national level. High Industrialization was concentrated in the rural areas of Kyeonggi and Cheonnam, northern Chungpuk, western Chungnam, and northeastern Kyeongnam. This dimension was also a rural-centred one. They were mostly the rural areas whose level of Urbanism was low in 1970.

2) The Structure of Total Ecological Change

Ecological change of a given area appears as a combination of all the change dimensions and may be defined as "the structure of total ecological change". In order to gain this, a new single composite index was constructed by the following statistical equation.

$$C = F.\ D.\ e$$

Where: C is a new single composite index of dimensional scores from all the dimensions extracted.
F is the matrix of dimensional scores.
D is the diagonal matrix which is of order of number of factors.
e is the vector of eigenvalues or proportionate eigenvalues.

However, in this study, the identity matrix was used instead of the diagonal matrix, because no theoretical background is possible regarding which change dimension is the stimulant, retardent, or is neutral. The same number of classes as those in the individual change dimensions (six classes) were employed in the classification of homogeneous areas in terms of the degree of total ecological change over the decade, using an interval of 0.5 standard deviation from the mean score.

High levels of total ecological change occurred in the southern and northeastern regions, while the central and northwestern regions experienced low levels of change. The latter category related particularly to areas adjacent to Seoul. By province, high levels of total ecological change were spatially concentrated on Kangwon, Cheonnam and Kyeongnam. Cheju and Kyeonggi were regions where the level of total ecological change was low, while other provinces showed a relatively moderate level of total change. By urban-rural contrast, rural areas experienced a higher level of total ecological change and these were mostly in large rural areas where new industrial complexes were established in accordance with a series of Five-Year Economic Development Plans, and/or they were in rural areas adjacent to cities. Although all urban areas together showed a low level of total ecological change, relatively higher levels occurred in small and medium-sized cities rather than in metropolitan cities.

These findings imply that metropolitan cities registered relatively low levels of ecological change over the decade. However, this does not mean that the absolute level of change occurred in the order identified above, because change was measured by the level change within each area. Thus, these findings mean that the internal change was relatively greatest in socially stable, even stagnant, rural areas over the decade, compared with urban areas.

8. An Evaluation of Korea's Ecological Structure and Change

8.1: National and Regional Development Planning in Korea

National and regional development planning can be said to play an important role in determining ecological structures and changes, because one of the marked changes in our time has been the emergence of policy formation and planning for the direct and deliberate contrivance of change. In this section, then, an overall evaluation of the ecological structure and change in Korea will be attempted in relation to national and regional

development planning launched by the Korean government over the decade, 1970-1980.

National development planning concentrated on economic development by means of a series of five-year economic development plans. The major goal was to promote modernization of industrial structure. This was promoted by means of urban development and thus this policy may be called urban-centred (Suh 1978), with a strategy of an export-oriented industrialization (Suh 1978; Ahn 1986).

It was in 1971 that the government adopted regional development planning, defined in terms of "industrial estate development" and "rural development". The purpose of the former was to provide industrial sites in support of sustained national economic growth and a balanced development among regions. This was to be achieved through the dispersion of industry into local areas. Its main instruments were a combination of public and private investments (see Suh 1978). These moves would mean that even regional development planning was characterized by an urban-based policy under the strong initiative of the central government.

New Community Movement, was launched in 1971 on a national scale and it came to be the only uniquely-integrated rural development programme. The specific programmes focused on three categories (Choi 1982) — increases in farm income, environmental improvements to living conditions, and spiritual enlightenment and rationalization of living. The Movement were not only to increase farm income, but also to facilitate the exploitation of development potentials and the enhancement of linkages between urban industrialization and rural development.

It can thus be concluded that national development planning was characterized initially by an industrial orientation which was urban-based. After 1970, however, the Industrial Estate Development Planning and the New Community Movement were introduced. Initially, these were intended to balance the development process among regions by improving regional economies, with a strong emphasis being placed on industrial production and a strong connection between industrial and other sectors being included. Regional development was also initiated by a strong bureaucratic intervention by the central government. This would imply that planning and execution of even regional development projects had been largely dictated by the criteria and principles of nationwide uniformity rather than the needs of the region (Ahn and Kim 1984). This was largely because the functions of local government were assigned or delegated by authorities in central government, with local governments having limited financial capabilities (Ahn and Kim 1984).

8.2: Ecological Structure

In both 1970 and 1980, five factors appeared as the underlying dimensions of Korean ecological structure, with four of the dimensions appearing in both years.

Urbanism has originally been used to define a way of life prevailing in urban settings, which involves impersonal, superficial, transitory and segmental human relationships (see Wirth 1938). It has been portrayed as a way of life which grows as a reaction to urbanization and industrialization (Summers and Branch 1984) and it is a social process in which spatial and locational strategies are used to structure social accessibilities (Williams 1978). In this study, however, Urbanism was defined as a structural profile of urban socioeconomic, cultural and demographic characteristics and living conditions, and represented a modernizing industrial structure. The core of development policy introduced by the Korean government was to build an industrial structure. This policy resulted in the industrialized structural profile and so, the appearance of Urbanism may be a significant result of the policies. However, the structural profile of Urbanism did not show a mature industrialization. The fact that Urbanism was the strongest dimension in both 1970 and 1980 may imply that the most important axis of ecological structure of Korea had not been changed.

Industrialism did not appear as a structural dimension in 1970, but Urbanism included some profiles of Industrialism. This would imply that in 1970 Industrialism was too weak to form a separate dimension. In other words, the early stage of development resulted from the industrialization policy consolidated a foundation of industrial society, but was not strong enough to structure Korea as an industrialized country. This finding illustrates that the development policy resulted in the appearance of Urbanism earlier and then brought about Industrialism later.

Urban Familism may have resulted from the family planning programme which has been operating free of charge since 1961. It is well-known that small families accompany urbanization and industrialization. Thus, the beginnings of the process of Korean industrialization may also have seen to appear with Urban Familism as an underlying ecological structure in both 1970 and 1980.

Religiosity reflects the existence of strong religious orientations in Korea. It is not associated directly with development planning itself, although religiosity has been historically important in Korea, particularly in rural areas. Also, the rapid transformation to an urban-industrializing society, accelerated by development planning,seemed

to have an impact on the growth of a strong commitment to religion (Rho 1985).

State Intervention reflects the strong bureaucratic character of the Korean government. In Korea, government programmes have always been executed for radical change, with policies aiming to achieve a basic structural change in a very short period of time (see Kim 1985). It is thus apparent that the increased bureaucratic involvement in infrastructural improvements and the strong directives from the government to the people, appear to remain as an underlying structural dimension.

Social Benefits appeared only in 1970. The structural profile of this dimension is a reflection of the early stage of development when national development planning was launched in the 1960s. Thus, the appearance of this dimension in 1970 may be a reflection of the beginning of the transformation in the quality of life resulting from the initial stage of development.

In factorial ecological terms, the dimensions of ecological structure have usually been presented in a descriptive way only. However, it is possible to distinguish between developmental and discrete dimensions. The dimension, conceptually characterized by an incremental increase over time, may be defined as a developmental one, and Urbanism, Urban Familism, Social Benefits, and Industrialism may be defined in this way. In contrast, where the conceptual adherent is represented merely be changes in patterns over time, but without an incremental increase, these may be defined as discrete dimensions. In this way, Religiosity and State Intervention can be called discrete dimensions.

Developmental dimensions were all spatially urban-dominated. This may be a result of the fact that national and regional development planning tended to be productive of alternative urban futures. Meanwhile, discrete dimensions were rural-centred. Rural-centred Religiosity may be associated with the historical background of Korean rural social structure. Rural areas in Korea have been based on small-scale, economically self-sufficient agriculture, characterized by primary social relationships and social units more or less isolated from the outside world (Choi 1982). This structural characteristic has also been represented by a strong community integration in the form of religiosity (Han 1966). That State Intervention was rural-dominated may reflect the fact that the involvement of government activities in the formation of infrastructure was stronger in rural areas.

Another important aspect of Korean ecological structure was a less-differentiated structural profile. As discussed earlier, factor structures were demarcated very clearly

between developmental and discrete dimensions, but was rather less clear between developmental dimensions. The less differentiation between ecological structural profiles is a characteristic which often exists in preindustrial cities (Janson 1980).

In addition, some areas, mostly developing big rural areas and small cities, showed a tendency towards a high level of developmental dimensions together with a high level of discrete dimensions. This may imply that developmental and discrete structural profiles co-exist in such areas because they are in a transition from a pre-industrial structure to an industrialized one. This is another kind of less-differentiation.

8.3: The Structure of Ecological Change

Seven dimensions appeared as the underlying change axes of Korean ecological structure over 1970-1980, with the strongest change dimension being Rurbanization. This may illustrate that the strongest structural change of Korea as a whole was a change to an urbanizing or industrializing structure, but still including rural profiles. This is strongly associated with the execution of development planning aimed at the industrialization of rural areas.

The appearance of Social Stagnation may imply that the benefits of development might not apply to all areas due to the urban-bias of development planning. Expansion of Financial Activity is a direct result of the policy of increased investment and financing, while "Improvements in the Quality of Life" relflects an improvement in living conditions which was associated with the process of development. "Increase in Birth Control" was a direct result of the family planning programme which had been launched in 1961, as well as a trend towards a smaller family size which usually accompanied industrialization.

However, Religious Growth is not associated directly with the process of development planning. As discussed earlier, it was a social consequence of the process of development. Industrialization is a change dimension resulting directly from the way development planning was aimed at industrial promotion. Yet, Industrialization emerged as the weakest change dimension, although the resulting structural profiles from industrialization were included partly in other change dimensions.

There existed a significant difference in the spatial patternings of change dimensions between urban and rural areas, as well as between provinces. The difference was more marked between urban and rural areas. Overall, this result may be associated with the

fact that the basic policy of national development was an urban-centred one with little care for equal regional development across the country.

For all the seven change dimensions, high change occurred in rural areas and this may be termed rural-dominant change. This rural-dominant change was revealed more clearly in the structure of total ecological change and this pattern of change implies that the internal changes in rural areas had been far more intense than that in urban areas. It may be thus said that the ecological process of internal changes over the decade was characterized by the industrialization of rural areas. Such an intensive internal change in rural areas in the 1970s was a result of strong socio-economic mobilization by government development planning, the massive participation of rural people in the mobilization, increased social mobility, and increased social contact between communities (see Kim 1985). As a result, rural areas, which were traditionally isolated from the outside world, have become part of the "open society" (Kim 1985), with a system of continuous exchange developing throughout the whole country (Choi 1982).

The rural-dominance of change over the decade might eventually result in an urban-rural convergence in terms of the level of development, even if, relatively, there is deprivation and economic backwardness in rural areas (see wang 1984). Such a convergence may be said to represent a process of decentralization on a national scale, in that development is gradually spreading from urban areas as the centre, to rural areas as the periphery. However, this does not imply that this process was characterized by a deindustrialization of urban areas as currently found in advanced industrial countries (see Hill and Negrey 1987), because it is clearly seen that in 1980 developmental structural dimensions still showed a strong urban dominance. This, in turn, relates to why "change in ecological structure" was virtually stable over the decade, 1970-1980. The urban-dominant structure of developmental dimensions may indicate that the ecological structure of Korea is characterized by an urban explosion, with this explosion in today's Third World generally being addressed in theories of modernization, urban-bias, and economic dependency (Bradshaw 1987).

Thus, Korea can be characterized as an industrializing society in terms of the profile of ecological structure as a whole. The evidence comes from the following facts. An urban-industrial structural profile appeared as an underlying dimension in both 1970 and 1980. However, Korean traditionalism still appeared as a basic dimension of ecological structure. A strong bureaucratic, authoritarian government role, which possibly

prevails in underdeveloped and developing countries, is manifested in an underlying structural profile. A low level of structural differentiation existed between the urban-industrial profiles and this is a characteristic often found in pre-industrial societies (Janson 1980). The low level of structural differentiation between traditionalism and modernity also existed in developing rural areas and in small and medium-sized cities where a rapid structural change took place. Even if far more intensive internal change occurred in rural areas over the decade, developmental dimensions were still disproportionally urban-oriented. The accompanying urban explosion represents the structural profile often found in developing countries (Bradshaw 1987).

The fact that Korea is characterized as an industrializing society in terms of ecological structure is also evidenced from the structural profiles emerging as change dimensions. For example, development towards industrialization and its resulting structural profiles consists of an underlying change axis. A dialectic tension against industrial development, which may possibly occur in the beginning or in the early stage of rapid structural change from traditional to industrial society, also constitutes an underlying change dimension. Finally, the bureaucratic role of government, even if it was related to the national and regional planning, also works so strongly as to constitute an underlying change dimension.

9. Conclusion

Since the so-called Chicago School emerged in the 1920s, social ecology expanded both substantively and methodologically through new idears. However, their primary concern has been with conceptualizing and interpreting spatio-social structure and change. The review of leading studies of social ecology revealed that the investigation of ecological structure should be done in terms of the spatial distribution of population and social activities, which are understood as the basic components of ecological structure. Some students take a position that the investigation of ecological structure should be extended to the relationships between the components. In this thesis, however, the investigation of this relationship was excluded from analysis due to a statistical reason inherent in the factor analytical technique in general.

In both years, five factors appeared as the underlying dimensions with which Korean

ecological structure can best be described. Each dimension showed a distinctive spatial differentiation.

Over the decade, "change in ecological structure" showed a remarkable stability, while "the structure of ecological change" was highly variable, with seven dimensions being appeared. This illustrates that changes in the variables under consideration are less highly associated than are their ecological distribution at a single point in time. The spatial structures of change dimensions were more independent of each other or less compact than those of structural dimensions. Their spatial patterning was also distinctive between provinces, as well as between urban and rural areas. The changing process was characterized by the industrialization of rural areas which suggests some urban-rural convergence. In addition, their spatial patterning was bound to be significantly influened by the initial structural profile of the areas in 1970 in which the change occurs.

The configuration of ecological structure and change in Korea was significantly influenced by national and regional development planning. The influence was exerted by the direct effect of development policy and/or through the impact of development promoted by the policy. The influence appeared not only in the determination of ecological structural and change dimensions, but also in their spatial patterning. Overall, the profile of ecological structure and change of South Korea can be characterized as urban-industrializing rather than industrialized or pre-industrial.

In sociological studies, social structure and change have been analyzed from a variety of approaches. The ecological approach is one of these and one whose primary concern is with conceptualizing and interpreting social structure and change in spatial terms. It is true that social ecological theory has been ignored in sociology over the last few decades, but, recently, sociologists have again become interested in inquiring into the spatial dimension (e. g. Williams 1978; Giddens 1981; Urry 1985). It should also be emphasized that the study of spatial distribution leads in general to only a first approximation of the patterns of social interaction among variously defined social categories (Jones 1965).

Empirical studies of factorial ecology have been done mostly on urban areas. Factorial study of ecological structure at a national level has been rare. Also, no factorial analysis of ecological change has been done on a whole country. In these respects, this study as a national factorial ecology has been exploratory and the results provide hypotheses for theorizing about ecological structure and change at a national level, particularly

for other developing countries. The results of this study may be conducive not only to the examination of existing theories of ecological structure and change, but also to ecological theory, in suggesting a classification of structural differentiation and its changing pattern where they are applied to a national scale. This study may also show the value of the ecological approach to understanding regional development. In practice, the dimensions extracted as ecological structure and change may be used as independent variables in regional research on Korea. The results could also be used as a framework for regional or national development planning of Korea. In other words, the results of this study show obvious examples in which financial or other provisions may be allocated to economically and socially deprived areas in order to boost regional development.

Moreover, this study provides a number of suggestions for further research. It provides the basis for further research against which the result can be compared and possibly verified. Repeated studies will show changes in the dimensions of structure and change. New dimensions appearing in particular years may be added from other analyses. Another possibility rests on a consideration of the linkages between the structural profile of a certain area at one period, the constellation of changes which occur at a succeeding time periods, and the resulting structural profile at the end of the time period. Such an approach will further clarify processes underlying ecological change. The focus of this study has been on formal characteristics of ecological structure and change, these following the rather general but limited scope of factorial ecology based on a descriptive level aiming at fact-finding. Nevertheless, the formal characteristics may provide the base for further study in terms of causal (see Janson 1980) or functional (see Ayeni 1979) associations between the dimensions of ecological structure and change.

However, this study makes no claim to uniqueness, in that other measures could have been involved which might have modified or improved the result. Apparent limitations are associated first with the limited selection of variables, secondly, with the fact that the factor analytical technique is no substitution for a careful theoretical and conceptual analysis of a problem. The technique may be used only as a part of such an approach and is rather in the position of an ex post facto rationalization for the choice of variables representing the conceptual meaning of ecological structure. Thirdly, in approaching the structure of ecological change, a critical re-evaluation of the measuring of change coefficients is also necessary. It is not clear that the formulation used here is the most satisfactory. It is possible that a different metric would be technically and

theoretically more satisfactory and result in a higher level of explanation. The same may be said with regard to the technique used here for creating the total ecological structure and the structure of total ecological change. Finally, as usual in factorial ecology, the terms defined as ecological structural and change dimensions in this study do not represent a full range of their conceptual adherents, but cover some aspects of them.

Despite such limitations, this study includes the importance of undertaking national factorial ecologies, the pattern of ecological structure and change for developing countries at a hypothetical level, the relationship between national and regional development planning and ecological structure and change, as well as significant implications arising from the study of ecological structure and change for further national and regional development planning.

APPENDIX

Table 2.1 : 1970 Factor Matrix

Variable	Unrotated Factors					Varimax Rotated Factors					Commun-ality
	I	II	III	IV	V	I	II	III	IV	V	
1	847	-336	191	-033	098	709	360	-235	-342	269	877
2	778	-060	-019	087	-084	725	214	-215	-005	077	624
3	-778	178	052	279	004	-565	-565	239	062	-137	718
4	-771	-047	113	276	196	-616	-544	158	-129	075	723
5	-590	-388	368	-046	028	-549	-174	052	-546	-065	637
6	-932	-042	-029	020	116	-859	-359	127	-027	-041	885
7	-471	328	118	-300	163	-467	069	474	107	-023	460
8	833	013	024	-062	-024	737	365	-106	009	113	700
9	757	096	205	-148	-175	711	394	055	-079	-089	678
10	842	-031	108	199	168	809	127	-087	-078	323	789
11	806	-057	-009	199	190	748	124	-166	-007	355	729
12	652	012	029	-078	-095	581	311	-089	-001	010	442
13	-927	-105	-003	029	153	-863	-362	103	-086	003	894
14	-494	379	201	-084	-413	-305	-159	391	078	-573	606
15	774	045	-138	169	082	720	141	-186	156	243	656
16	737	-057	-013	-089	-182	646	360	-196	-011	-044	587
17	729	-053	002	-070	-134	641	339	-174	-020	000	556
18	771	054	033	069	083	717	219	-057	029	211	611
19	636	263	-081	-012	-107	613	232	015	246	-022	491
20	723	-013	234	-026	119	662	280	049	-170	214	594
21	653	101	139	087	-064	667	145	022	-024	031	468
22	752	292	-136	098	-140	753	176	-043	311	-020	697
23	-377	304	-280	103	235	-338	-235	149	403	156	378
24	711	030	194	096	-023	714	160	002	-110	086	555
25	612	-074	-207	-230	303	376	465	-166	121	409	567
26	126	395	-355	117	119	138	-064	058	532	130	326
27	-165	119	-117	167	035	-099	-216	022	165	017	084
28	165	424	-049	-036	-159	225	063	218	315	-187	236
29	-141	429	-577	-176	-129	-196	117	-018	710	-166	584
30	-230	692	488	-069	140	-040	-109	877	069	-077	793
31	-211	677	524	-092	163	-030	-082	895	032	-055	813
32	522	162	-205	-196	398	333	384	037	272	452	538
33	914	-014	196	135	088	884	205	-041	-135	239	901
34	837	080	128	164	-032	847	145	-035	-024	107	752
35	652	-068	219	-137	107	551	360	027	-197	187	508
36	715	338	-084	208	037	748	056	052	303	142	677
37	674	272	-098	212	012	703	042	-004	270	123	584
38	796	-188	-057	-297	032	567	589	-240	-064	175	761
39	414	-093	-071	102	-042	382	072	-205	005	066	198
40	-350	-059	104	449	-116	-139	-549	-027	-119	-128	352
% of total variance	44.10	6.48	4.38	2.73	2.40	36.13	8.53	6.35	5.28	3.80	60.09
Eigenvalue	17.64	2.59	1.75	1.09	0.96	14.45	3.41	2.54	2.11	1.52	24.03

NOTES : 1. Weights were multiplied by 1,000
2. Variable names are provided in Table 1.

APPENDIX

Table 2.2 : 1980 Factor Matrix

Variable	Unrotated Factors					Varimax Rotated Factors					Commun-ality
	I	II	III	IV	V	I	II	III	IV	V	
1	881	-258	-147	048	126	636	570	-285	141	-230	883
2	737	-024	-315	-313	072	308	781	-111	170	002	746
3	-748	-055	-109	213	473	-390	-374	140	-706	-182	843
4	-753	-040	-047	186	354	-412	-423	127	-591	-129	731
5	-351	-324	-252	436	-220	-261	-326	-054	040	-592	530
6	-923	-086	167	126	-039	-591	-695	024	-270	-007	906
7	-625	261	-001	-012	145	-414	-303	312	-320	135	481
8	828	160	-192	025	062	588	586	105	216	-077	753
9	479	244	072	-119	123	392	321	108	068	226	324
10	767	-107	148	082	226	724	333	-209	032	000	680
11	721	105	154	-247	217	563	484	-107	056	311	663
12	670	036	-182	-195	064	366	601	-053	161	029	525
13	-897	-158	154	093	095	-561	-633	-049	-392	-011	872
14	-347	488	-385	-010	-140	-415	042	592	041	-040	528
15	703	060	182	043	-001	626	261	-072	242	097	533
16	855	-013	-011	201	-053	712	368	-057	320	-163	775
17	805	-020	051	297	-056	740	251	-047	305	-191	742
18	765	126	071	189	082	720	306	054	178	-036	648
19	468	102	-322	-402	062	072	686	012	105	111	499
20	597	-030	-420	-075	166	290	661	-000	022	-215	568
21	632	304	-023	257	-042	595	238	277	259	-076	560
22	550	426	048	303	-298	524	081	389	484	-033	668
23	-614	257	343	104	-042	-268	-603	239	-130	251	572
24	634	-051	009	162	133	583	287	-079	072	-122	449
25	590	-163	333	035	040	589	108	-305	154	111	488
26	-193	228	630	-062	064	117	-439	032	-076	530	494
27	-138	126	261	-111	-035	-046	-180	024	012	285	116
28	030	521	-102	248	-162	093	-058	567	190	-031	371
29	-072	412	347	-501	-099	-126	009	138	136	710	558
30	-304	797	-090	084	191	-107	-086	811	222	231	779
31	-279	689	-131	069	199	-118	-042	718	-231	173	615
32	420	028	278	-056	048	418	104	-122	108	218	260
33	818	-027	-002	210	097	731	365	-064	166	-157	724
34	794	-039	185	129	149	765	289	-148	119	013	705
35	754	-035	170	099	193	727	300	-144	065	030	644
36	712	360	-006	141	-103	600	323	279	352	029	667
37	487	051	301	149	098	583	030	-056	078	107	361
38	819	-081	118	-123	-379	501	372	-247	627	079	850
39	288	-100	303	-070	060	314	019	-233	045	194	193
40	-448	-038	167	077	-041	-250	-402	-005	-107	039	237
% of total variance	40.13	7.00	5.15	3.83	2.75	24.53	15.60	7.10	6.78	4.85	58.86
Eigenvalue	16.05	2.80	2.06	1.53	1.10	9.81	6.24	2.84	2.71	1.94	23.54

NOTES : 1. Weights were multiplied by 1,000.
2. Variable names are provided in Table 1.

APPENDIX

Table 2.3 : Change Factor Matrix

Variable	Unrotated Factors						
	I	II	III	IV	V	VI	VII
1	-713	139	029	191	-018	114	095
2	242	153	058	-034	165	-167	-050
3	012	-302	649	-333	-144	-132	088
4	-115	075	-010	-212	005	036	019
5	-306	273	138	-008	050	219	-077
6	626	-056	-073	-331	102	010	-103
7	713	083	-009	-178	117	-083	-207
8	312	132	031	037	-188	005	352
9	511	086	167	-030	042	020	359
10	314	-043	014	-103	-224	016	195
11	188	029	-215	181	-038	-183	231
12	413	-206	-079	164	092	-062	133
13	820	023	-044	-162	-169	-038	-140
14	-512	-079	005	075	384	037	092
15	042	051	202	167	-109	067	-045
16	380	461	434	401	343	-148	-121
17	422	430	459	336	345	-163	-189
18	338	065	142	030	-062	026	068
19	188	061	115	103	-481	307	-125
20	249	312	279	100	-322	354	-005
21	270	077	135	130	-041	107	322
22	382	-038	-202	031	-100	-090	-051
23	715	-108	-097	-127	027	-060	-087
24	393	-033	-163	205	-002	043	-092
25	-374	-106	156	006	062	057	082
26	302	-118	056	-091	-123	-115	-210
27	046	107	-173	007	067	223	-052
28	166	-076	-163	-008	039	-491	250
29	-029	-404	097	203	163	-004	089
30	331	-010	-043	-454	406	360	111
31	254	028	004	-339	341	409	120
32	186	233	-231	-059	-038	037	-129
33	291	151	083	207	-133	363	128
34	315	-264	-050	354	-037	034	231
35	262	069	-068	042	253	118	390
36	210	-166	090	017	-168	-076	-011
37	289	-012	015	111	-138	-109	161
38	158	391	-742	293	030	085	-040
39	275	-602	062	295	156	102	-147
40	287	-676	-022	373	120	338	-198
% of total variance	14.08	5.45	4.78	4.28	3.63	3.40	2.85
Eigenvalue	5.63	2.18	1.91	1.71	1.45	1.36	1.14

— Continued —

APPENDIX

(Table 2.3 — Continued)

Variable	Varimax Rotated Factors							Commun-ality
	I	II	III	IV	V	VI	VII	
1	-705	-137	-102	-156	040	-173	062	586
2	197	-068	289	050	014	056	-108	144
3	094	-025	-016	027	-808	031	068	669
4	-049	-193	-085	-065	-033	109	-027	065
5	-325	-213	095	-176	027	087	211	244
6	631	021	062	075	006	345	-057	530
7	684	019	287	071	068	224	-008	610
8	142	-076	008	488	008	-004	110	276
9	250	021	190	520	-096	217	055	429
10	269	-022	-123	309	-079	030	096	200
11	089	063	009	326	193	-147	-163	204
12	259	334	070	275	061	042	-106	276
13	810	030	106	213	059	111	145	750
14	-559	082	021	-191	-022	112	-252	433
15	-024	057	125	036	-068	-102	235	091
16	069	035	900	143	039	-026	144	859
17	149	032	904	086	-007	-003	140	867
18	221	029	147	223	-052	049	149	148
19	185	006	-126	063	018	-124	578	404
20	097	-128	130	197	004	030	627	476
21	024	065	106	428	-026	084	154	231
22	390	090	-016	129	171	-056	-029	210
23	676	162	098	174	061	179	-035	560
24	300	238	094	109	249	-012	072	235
25	-367	021	-076	-103	-192	003	-021	189
26	404	064	027	-063	-105	-062	041	189
27	-003	-006	-025	-039	249	166	094	101
28	179	-012	021	288	-020	-192	-461	365
29	-125	438	-017	030	-162	-000	-120	249
30	199	-023	000	054	008	760	-060	624
31	092	-009	014	068	021	680	044	478
32	219	-159	030	-020	294	045	049	165
33	047	097	079	293	144	118	429	322
34	098	444	-013	367	067	-075	030	353
35	-023	086	108	411	126	310	-098	310
36	230	125	-039	093	-144	-106	062	115
37	198	071	042	306	-007	-112	025	153
38	078	-066	-010	106	892	-063	-053	824
39	176	734	005	-063	-099	040	003	585
40	154	873	-104	-104	020	113	161	847
% of total variance	10.35	5.30	5.10	4.83	4.80	4.15	3.93	38.45
Eigenvalue	4.14	2.12	2.04	1.93	1.92	1.66	1.57	15.38

NOTES : 1. Weights were multiplied by 1,000.
2. Variable names are provided in Table 1.

REFERENCES

Ahn, C. H. and K. D. Kim, 1984, "The Structure of Local Government in South Korea : Participation and Performance, "Seoul National University, South Korea, *Sahoe Gwahack gwa Jeongcheck* (Social Science and Policy), Vol.6, No.2, pp.91–115.

Ahn, C. Y., 1986, "Economic Development of South Korea, 1945–1985," *Korea & World Affairs*, Vol.10, No. 1, pp.91–117.

Alker, H. R. Jr., 1969, "A Typology of Ecological Fallacies," in M. Dogan and S. Rokkan (eds.), *Social Ecology*, Cambridge : The M. I. T. Press, pp.69–86.

Anderson, T. R. and J. A. Egeland, 1961, "Spatial Aspects of Social Area Analysis," *American Sociological Review*, Vol. 26, No. 3, pp.392–398.

Ayeni, B., 1979, *Concepts and Techniques in Urban Analysis*, New York : St. Martin's Press.

Bahrenberg, G., 1984, "Spatial Analysis : A Retrospective View," in G. Bahrenberg et al. (eds.), *Recent Development in Spatial Data Analysis : Methodology, Measurement, Models*, Aldershot : Gower Publishing Co. Ltd., pp.35–49.

Bailey, K. D. and P. Mulcahy, 1972, "Sociocultural versus Neoclassical Ecology : A Contribution to the Problem of Scope in Sociology," *Sociological Quarterly*, Vol. 13, No. 1, pp.37–48.

Blau, P. M., 1977, "A Marcosociological Theory of Social Structure," *American Journal of Sociology*, Vol. 83, No. 1, pp.26–54.

Bradshaw, Y. W., 1987, "Urbanization and Underdevelopment : A Global Study of Modernization, Urban Bias, and Economic Dependency," *American Sociological Review*, Vol. 52, No. 2, pp.224–239.

Brown, L. A. and F. E. Horton, 1970, "Social Area Change : An Empirical Study," *Urban Studies*, Vol. 7, No. 3, pp.271–288.

Burgess, E. W., 1925, "The Growth of the City : An Introduction to a Research Project," in R. E. Park et al. (eds.), *The City*, Chicago : University of Chicago Press, pp. 47–62.

Butler, J. M., 1969, "Simple Structure Reconsidered : Distinguishability and Factorial

Invariance in Factor Analysis", *Multivariate Behavioral Research*, Vol. 4, No. 1, pp. 5–28.

Buttimer, A., 1968, "Social Geography", in D. L. Sills (ed.), *International Encyclopedia of the Social Sciences*, New York: The Macmillan Publishing Company, Inc., Vol. 6, pp.134–145.

Charnock, D. M., 1982, "The Internal Heterogeneity of Australian Census Units and Its Effect on Social Ecological Analyses", *Australian and New Zealand Journal of Sociology*, Vol. 18, No. 1, pp.83–92.

Child, D., 1979, *The Essentials of Factor Analysis*, 6th ed., London: Brown Knight and Truscott Ltd.

Choi, H., 1982, "Development and Change in Rural Korea", Rural Economics Institute, South Korea, *Journal of Rural Development*, Vol. 5, No. 2, pp.231–245.

Chojnicki, Z. and T. Czyz, 1976, "Some Problems in the Application of Factor Analysis in Geography", *Geographical Analysis*, Vol. 8, No. 4, pp.416–427.

Clark, T. N., 1972, "Urban Typologies and Political Outputs", in B. J. L. Berry (ed.), *City Classification Handbook*, New York: Wiley-Interscience, pp.152–178.

Cowgill, D. O. and M. S. Cowgill, 1951, "An Index of Segregation Based on Block Statistics", *American Sociological Review*, Vol. 16, No. 6, pp.825–831.

Cureton, E. E. and S. A. Muliak, 1971, "On Simple Structure and the Solution to Thurstone's 'Invariant' Box Problem", *Multivariate Behavioral Research*, Vol. 6, No. 4, pp.375–387.

D'sa, E. R., 1986, "Social Indicators and Spatial Disparities in Papua New Guinea", *Social Indicators Research*, Vol. 18, No. 3, pp.285–319.

Elffers, H., 1980, "On Uninterpretability of Factor Analysis Results", *Transactions* (The Institute of British Geographers), New Series Vol. 5, No. 3, pp.318–329.

Firey, W., 1945, "Sentiment and Symbolism as Ecological Variables", *American Sociological Review*, Vol. 10, No. 2, pp.140–148.

_____, 1947, *Land Use in Central Boston*, Cambridge: Harvard University Press.

Gerson, E.M., 1976, "On Quality of Life, "*American Sociological Review*, Vol. 41, No. 5, pp.793–806.

Giddens, A., 1981, *A Contemporary Critique of Historical Materialism*, London: The

Macmillan Press, Ltd.

Hammond, J. L. Jr., 1973, "Two Sources of Error in Ecological Correlations," *American Sociological Review*, Vol.38, No.6, pp.764–777.

Han, S. B., 1966, "Hankuk Sanchon Jumin eui Euisik gwa Sinang," (Ritual and Religiosity in Korean Rural Community) *Hankuk Sahoehack* (Korean Journal of Sociology), Vol.2, pp.84–100.

Harman, H. H., 1976, *Modern Factor Analysis*, 3rd ed., Chicago: University of Chicago Press.

Harris, C. W., 1967, "On Factors and Factor Scores," *Psychometrika*, Vol.32, No.4, pp. 363–379.

Hawley, A. H., 1950, *Human Ecology: A Theory of Community Structure*, New York: The Ronald Press Co.

Haynes, K. E., 1971, "Spatial Change in Urban Structure: Alternative Approach to Ecological Dynamics," *Economic Geography*, Vol.47, No.2 (Supplement), pp.324–335.

Hill, R. C. and C. Negrey, 1987, "Deindustrialization in the Great Lakes," *Urban Affairs*, Vol.22, No.4, pp.580–597.

Hoiberg, E. O. and J. S. Cloyd, 1971, "Definition and Measurement of Continuous Variation in Ecological Analysis," *American Sociological Review*, Vol.36, No.1, pp.65–74.

Hunter, A. A., 1972, "Factorial Ecology: A Critique and Some Suggestions," *Demoraphy*, Vol.9, No.1, pp.107–117.

Janson, C. G., 1969, "Some Problems of Ecological Factor Analysis," in M. Dogan and S. Rokkan (eds.), *Social Ecology*, Cambridge: The M. I. T. Press, pp.301–341.

_____, 1971, "A Preliminary Report on Swedish Urban Spatial Structure," *Economic Geography*, Vol.47, No.2 (Supplement), pp.247–257.

_____, 1980, "Factorial Social Ecology: An Attempt at Summary and Evaluation," *Annual Review of Sociology*, Vol.6, pp.433–456.

Johnston, R. J., 1971, "Some Limitations of Factorial Ecologies and Social Area Analysis," *Economic Geography*, Vol.47, No.2 (Supplement), pp.314–324.

_____, 1984, "Quantitative Ecological Analysis in Human Geography: An Evaluation of Four Problem Areas," in G. Bahrenberg et al.(eds.), *Recent Development*

in Spatial Data Analysis : Methodology, Measurement, Models, Aldershot : Gower Publishing Co. Ltd., pp.131-141.

Jonassen, C. T., 1949, "Cultural Variables in the Ecology of an Ethnic Group," *American Sociological Review*, Vol.14, No.1, pp.32-41.

_____, 1961, "Functional Unities in Eighty-Eight Community Systems," *American Sociological Review*, Vol.26, No.3, pp.399-407.

Jones, F. L., 1965, "A Social Profile of Canberra, 1961," *Australian and New Zealand Journal of Sociology*, Vol.1, No.2, pp.107-120.

Kim, I. C., 1985, "Structural Change in Korean Communities," paper presented at the 4th Asian Regional Conference of Sociology, Kobe, Japan, 15th-17th October.

Kosa, J., 1956, "Hungarian Immigrants in North America: Their Residential Mobility and Ecology," *Canadian Journal of Economics and Political Science*, Vol.22, No.3, pp.358-370.

Latif, A. H., 1974, "Factor Structure and Change Analysis of Alexandria, Egypt, 1947 and 1960," in K. P. Schwirian (ed.), *Comparative Urban Structure : Studies in the Ecology of Cities*, London : D. C. Health and Company, pp.338-349.

Lim, H. S., 1983, "Hankuk Sahoe eui Gujo Byeunhwa," (Structural Change of Korean Society) in H. S. Lim and S. P. Kang (eds.), *Hankuk Sahoe Ron* (Korean Society), Seoul : Min-Eum Publishing Co., pp.255-275.

McElrath, D. C., 1962, "The Social Areas of Rome : A Comparative Analysis," *American Sociological Review*, Vol.27, No.3, pp.376-391.

McKenzie, R. D., 1926, "The Scope of Human Ecology," *Publication of the American Sociological Society*, Vol.20, pp.141-154, reprinted in G. A. Theodorson (ed.), *Studies in Human Ecology*, New York : Harper & Row, pp.30-36.

Menzel, H., 1950, "Comment on Robinson's 'Ecological Correlations and the Behaviour of Individuals'," *American Sociological Review*, Vol.15, No.5, p.674.

Murdie, R. A., 1969, *Factorial Ecology of Metropolitan Toronto*, 1951-1961 : *An Essay on the Social Geography of the City*, Chicago : University of Chicago Press.

Myers, J. K., 1950, "Assimilation to the Ecological and Social System of a Community," *American Sociological Review*, Vol.15, No.3, pp.367-372.

_____, 1954, "Note on the Homogeneity of Census Tracts : A Methodological

Problem in Urban Ecological Research", *Social Forces*, Vol.32, No.4, pp.364–366.

Newton, P. W. and R. J. Johnston, 1976, "Residential Area Characteristics and Residential Area Homogeneity: Further Thoughts on Extensions to the Factorial Ecology Method", *Environment and Planning A*, Vol.8, No.5, pp.543–552.

Openshaw, S., 1984, "Ecological Fallacies and the Analysis of Areal Census Data", *Environment and Planning A*, Vol.16, No.1, pp.17–31.

Park, R. E., 1925, "Community Organization and the Romantic Temper", in R. E. Park et al.(eds.), *The City*, Chicago: University of Chicago Press, pp.113–122.

Perle, E. D., 1977, "Scale Changes and Impacts on Factorial Ecological Structures", *Environment and Planning A*, Vol.9, No.5, pp.549–558.

Poplin, D. E., 1972, *Communities: A Survey of Theories and Methods of Research*, New York: The Macmillan Publishing Company, Inc.

Quinn, J. A., 1950, *Human Ecology*, New York: Prentice-Hall, Inc.

Rees, P. H., 1971, "Factorial Ecology: An Extended Definition, Survey, and Critique of the Field", *Economic Geography*, Vol.47, No.2 (Supplement), pp.220–233.

Rho, K. M., 1985, "Chilsip Yeundae eui Jongkyo Sungjang gwa Apeuroeui Jeonmang", (The Growth and Prospect of Religion in the 1970s) in Korean Sociological Association (ed.), *Hankuk Sahoe Eudiro Gago Inna?* (Where is Korean Society Going?), Seoul: Hyeundae Sahoe Yeungu So Press, pp.85–106.

Robinson, W. S., 1950, "Ecological Correlations and the Behaviour of Individuals", *American Sociological Review*, Vol.15, No.3, pp.351–357.

Robson, B. T., 1971, *Urban Analysis: A Study of City Structure with Special Reference to Sunderland*, Cambridge: University of Cambridge Press.

Rubinstein, D., 1986, "The Concept of Structure in Sociology", M. L. Wardell and S. P. Turner (eds.), *Sociological Theory in Transition*, Boston: Allen & Unwin pp. 80–94.

Rummel, R. J., 1970, *Applied Factor Analysis*, Evanston: Northwestern University Press.

Seeman, A. L., 1938, "Communities in the Salt Lake Basin", *Economic Geography*, Vol. 14, No.3, pp.300–308.

Shevky, E. and W. Bell, 1955, *Social Area Analysis: Theory, Illustrative Application and Computational Procedures*, California: Stanford University Press.

Shevky, E. and M. Williams, 1949, *The Social Area of Los Angeles : Analysis and Typology*, Berkeley : University of California Press.

Suh, S. C., 1978, *A Study of Regional Development in Korea*, Seoul : Korea University Press.

Summers, G. F. and K. Branch, 1984, "Economic Development and Community Social Change," *Annual Review of Sociology*, Vol.10, pp.141–166.

Sweetser, F. L., 1965, "Factor Structure as Ecological Structure in Helsinki and Boston," *Acta Sociologica*, Vol.8, No.4, pp.205–225.

_____, 1971, *Massachusetts Social Ecology*, 1960, Boston : Massachusetts Department of Mental Health.

_____, 1974, "The Use of Factorial Ecology in Classification," in M. S. Archer (ed.), *Current Research in Sociology*, The Hague : Mouton & Co., pp.317–343.

Timms, D. W. G., 1971, *The Urban Mosaic : Towards a Theory of Residential Differentiation*, Cambridge : University of Cambridge Press.

Tryon, R. C., 1955, *Identification of Social Areas by Cluster Analysis : A General Method With an Application to the San Francisco Bay Region*, Berkeley : University of California Press.

Tucker, L. R., 1971, "Relations of Factor Score Estimates to Their Use," *Psychometrika*, Vol. 36, No.4, pp.427–436.

Urry, J., 1985, "Social Relations, Space and Time," in D. Gregory and J. Urry(eds.), *Social Relations and Spatial Structure*, London : The Macmillan Press, Ltd., pp.20–48.

Velicer, W. F., 1976, "The Relation between Factor Score Estimates, Image Scores, and Principal Component Scores," *Educational and Psychological Measurement*, Vol.36, No.1, pp. 149–159.

Wackwitz, J. H. and J. L. Horn, 1971, "On Obtaining the Best Estimates of Factor Score Within an Ideal Simple Structure," *Multivariate Behavioral Research*, Vol.6, No.4, pp.389–408.

Wang, I. K., 1984, "Nongchon gwa Dosi eui Bungi wa Sureum," (Divergence and Convergence of Rural and Urban Society in Korea) Seoul National University, South Korea, *Nonghack Yeungu* (Agricultural Study), Vol.9, No.2, pp.83–94.

Williams, O. P., 1978, "Urbanism and Socio-Economic Processes in Space," in Z. Mlinar and H. Teune(eds.), *The Social Ecology of Change : From Equilibrium to Development*, London : SAGE Publications, pp.65–75.

Wirth, L., 1938, "Urbanism as a Way of Life," *American Journal of Sociology*, Vol.44, No.1, pp.1–24.

〈國文抄錄〉

韓國의 生態構造와 變動, 1970 ~ 1980

鄭 大 然

사회학에서 생태구조란 人口와 사회적 활동의 空間的 分布의 유형을 뜻한다. 人口란 하나의 집단으로서의 개인들의 合이고, 사회적 활동이란 여러 제도적 단위들이 수행하는 기능이다.

'60 년대 이후 한국사회는 급진적 변동을 경험했고, 이것은 근대화로의 변동이었다. 이 변동은 특히 '70 년대부터 더욱 본격화되었고, 그것의 공간적 분포의 유형이 중요한 의미를 갖는다. 때문에 본 연구는 1970 년과 1980 년의 한국 생태구조와 이 기간동안의 구조적 변동의 분석에 목적이 있다.

이를 위해 생태구조의 구성단위를 측정할 수 있는 40 개 변인을 선정하여 要因分析 (factor analysis) 이라는 통계학적 기법으로 생태구조의 기본 축을 추출하고, 각 축들의 공간적 분포 유형을 要因點數 (factor score) 라는 측정치로 분석하였다. 생태구조의 구조적 변동은 「생태구조의 변동」과 「생태변동의 구조」라는 두 가지 방법으로 분석하였다. 생태구조와 변동의 축들을 다시 교차분석 및 단일 지표화의 기법으로 하나의 축으로 환원시켜 총체적 차원에서의 생태구조와 그것의 변동을 분석하였다.

1970 년과 1980 년의 생태구조의 축들의 공간적 분포 유형은 의미있는 차이가 있었고, 이 차이는 「총체적 생태구조」에서 더욱 뚜렷하게 나타났다. 「생태구조의 변동」은 비교적 안정적이었다. 그러나, 「생태변동의 구조」는 매우 변동적이었고, 그 축들의 공간적 분포 유형이 의미있는 차이가 있었고, 그 차이는 「생태변동의 총체적 구조」에서 더욱 뚜렷했다.

한국 생태구조와 변동의 축의 형성과 그것들의 공간적 분포의 유형은 '70 년대 한국의 국가발전 및 지역사회 발전 정책들과 유의미한 관계가 있었으며, 그 특징은 오늘날 제 3 세계의 발전에 관한 근대화 이론, 도시편파적 발전이론 및 종속이론의 설명 틀 가운데 도시편파적 발전이론에 더욱 가까웠다.