

Recent Changes in Japan's Urban System: A Review*

by

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I. Introduction

Japan entered the stage of high economic growth in the late 1950's. With the shift to more stable economic growth in the mid-1970's, both intra- and inter-prefectural migration has declined. By 1980 the number of out-migrants leaving the three major metropolitan areas had reached a level equal to the number of in-migrants entering such areas. Blumenfeld (1982) interprets to mean that the centripetal or "country-to-metropolis" movement of population is now being balanced by the centrifugal "outflow" from these major metropolitan areas. With the overall drop in the number of migrants, the trend toward further population concentration in the major metropolitan areas has been blunted (EPA, 1986).

Since 1970, migratory patterns have started to diversify, including: a decline in the flow to metropolitan areas and the outflow from metropolitan to non-metropolitan areas; a transition from migration to the larger cities to migration to medium to small cities; and a relative stability of migration among prefectures (Yamaguchi, 1983). There has also been a marked change in the position held by migration relative to increase in population. Natural increase has come to be the decisive factor contributing to population increase, particularly in the Tokyo metropolitan area. These suggest that migration in Japan has entered a new stage of mobility transition (Nanjo, 1981).

In the following sections, I would like to review the contributions of several leading Japanese geographers in terms of urban function, urban hierarchy and urban network, and to discuss the policy implications in relation to recent changes in Japan's urban system.

* This report is an expanded version of the paper given at the Third General Meeting of the IGU Commission on Urban Systems in Transition held in Dublin, Ireland, on the 22nd of June, 1987.

II. Function

In 1967 I attempted to fill a gap in the knowledge of Japanese cities by developing a parsimonious classification of urban functions (Yamaguchi, 1969 and 1972). Later, Hino (1977) also made a study of the Japanese urban system for three time-periods using principal component analysis. The purpose of his paper was to provide an overview of the development of the Japanese urban system by means of comparing urban dimensions in 1950, 1960 and 1970.

He found that the following points were evident through changes in the Japanese urban system since 1950:

In the first place, social status was extracted as the first component through the three time-period, but the spatial distribution of the component scores revealed a remarkable contrast between cities located in the two metropolitan areas of Tokyo and Osaka and those cities located outside the two areas. Accordingly, white-collar workers have been concentrating in the two metropolitan areas since 1950, and the rate of concentration has also been accelerated since 1960. This interpretation is supported by the fact that the percentage of white-collar workers in the two metropolitan areas, relative to the nation as a whole, had reached a level of 45 per cent by 1970. This concentration reflects the continued agglomeration of management functions in the largest metropolitan areas.

Secondly, the ruralism dimension extracted as the second component in 1950 moved down to become the fourth component in 1960 and disappeared in 1970. This phenomenon reflects the significant decline of agricultural workers in the city areas after 1950 and shows the rapid urbanization of the entire country. That is, the percentages of the labour force in primary industry, self-employed and household sectors, those which had high positive correlations with the ruralism component in 1950, have continuously reduced their variances in association with the decline of agricultural workers.

Thirdly, manufacturing activities, which were identified as the third component in 1950 and the second component in 1960 as well as in 1970, have an inverse correlation with variables describing the commercial functions of the built-up areas of cities in 1970. These functions are represented by variables such as the percentages employed in wholesale and retail sales, in finance, insurance and real estate, and in services. This finding suggests that the negative correlations between variables on manufacturing activities and those on commercial functions were strengthened by an increase in cities specialized either in manufacturing or in commerce after 1960. Rapid post-war industrialization and the functional differentiation

among those cities located within metropolitan areas are major contributors to such a phenomenon. Furthermore, many cities, including those in the Pacific Industrial Belt stretching from southern Kanto to northern Kyushu, specialize in manufacturing functions, and cities, located outside the belt, have developed a specialization in commercial functions. On the other hand, due to the marked functional differentiation among cities included in the metropolitan areas, suburban cities are split into either industrial or residential types.

Fourthly, the city size factor extracted as the fourth component in 1970 was correlated with two variables denoting the wholesale function of cities, such as the wholesale-retail ratio and per capita wholesale sales. This component indicates that differences among cities in per capita wholesale sales became analogous to those of population size in 1970. This has been due largely to the change in the structure of commodity distribution since 1960. Many distributional channels were amalgamated through the policies of large manufacturing concerns, the sales networks of large-scale wholesalers, and the emergence of chain-stores in the retail sector. The expansion of local wholesalers established in medium-to small-cities stagnated after 1960, and the discrepancy between large and medium-to-small cities in per capita wholesale sales has widened since then.

The amalgamation of management functions was a fundamental factor which brought about the population concentration in the two major metropolitan areas. Although manufacturing plants have been leaving due to the restriction on industrial sites, their offices are still concentrated in the two largest cities, sharing locational advantages with other non-manufacturing functions. Hino (1984) also points out some facts concerning the hierarchical differentiation of cities in terms of the location of head and branch offices of large enterprises in Japan. The primate city is Tokyo which has almost 40 per cent of all head offices of large companies with capital of over 100 million yen in the nation. In Japan, the most important informations necessary for such decision makings as short- and long-range activities of corporations must be obtained from ministries of the central government as well as from financial and business institutions by means of personal "face-to-face" contacts rather than through advanced telecommunication system. Many leading Tokyo-based companies cited easier access to ministries of central government as one of the decisive factors for locating their headquarters in Tokyo. In addition, Tokyo's convenience for raising funds and international trade can also be cited (Hayashi, 1986). Meanwhile, Osaka ranks the second and comprises approximately as much as one-fourth of those in Tokyo. The discrepancy between the two has widened especially since the end of the World War II through the period of Allied occupation to the present.

III. Hierarchy

As the dominant first-order central place of the nation, the Tokyo metropolitan area continues to increase in population. On the other hand, Osaka, which used to be a first-order central place and for many years a close rival of Tokyo, now stands as a second-order central place for the western half of the country. Nagoya, one of the three major metropolitan areas, has now downgraded to be a third-order central place for central Honshu, sharing the same order with four regional capitals mentioned later. Therefore, the Japanese urban system presents a typical hierarchical structure following Christaller's model. As long as the regional disparity of per capita income continues to exist, the hierarchical structure of the national urban system dominated by Tokyo will be further reinforced without any significant inter-metropolitan migration.

Analysis of the interactions among cities was made possible with the census results of 1980. Migration data were published for each city during the period of 1979–1980, for the first time, in 1983. Using these data Morikawa (1985) identified the hierarchical nature of Japan's urban system in comparison with case studies available in other developed countries in Europe. The following are findings in his study to explain the state of urban hierarchy in Japan around 1980:

In the first place, the Japanese urban system shows a model which is similar to Christaller's since the migration flows between cities of the same order and those between larger and smaller cities are not clearly observable. In stead, Morikawa introduces the notion of a "nodal flow" rate which is the sum of in- and out-migration rates.

He also indicates the differences with Pred's model of innovation diffusion in the following context. That is, Osaka follows Tokyo, the national capital; then come Sapporo and Fukuoka as regional capitals in the peripheral region, followed by Sendai and Hiroshima as intermediate regional centres. Nagoya, though a metropolitan area, is also included in the intermediate group of cities. Following them, there appear some central places, mostly consisting of prefectural capitals, that attract "nodal flows" of ten per cent or more from cities in smaller size categories within their own prefectures. Yokohama as well as Kyoto and Kobe, in the Tokyo and Osaka metropolitan areas respectively, are considered to be satellite centres and they do not attain the level of metropolitan centres.

Secondly, the metropolitan dominance of Tokyo has expanded not only into the northern Kanto and southern Tohoku but also to the interior prefectures of central Honshu. It may be argued that, in these areas, the prefectural capitals, sometimes in conjunction with the

second largest cities, previously formed their own local urban subsystems. However, these tributary areas have come under the influence of Tokyo and been amalgamated into the urban hierarchy focussed on Tokyo.

Thirdly, most of the smaller cities with less than 100,000 inhabitants show a net out-migration to prefectural capitals. Although a return migration to hometowns or nearby cities has been observed since 1970, they account for only a small portion of out-migrants. On the other hand, prefectural and regional capitals show an increase in the number of in-migrants, while net out-migration of "nodal flows" to metropolitan areas dominates. In other words, these cities are playing an intermediate role in absorbing the population from surrounding areas and then releasing their own population to metropolitan areas. Within metropolitan areas, satellite towns continue to increase their population due to natural increase as well as to net in-migration from the central cities. Therefore, as long as such migration flows continue, the hierarchical nature of the national urban system will be reinforced and, at the same time, the regional disparity between metropolitan and non-metropolitan areas will be widened, in contrast with the centrifugal nature of metropolitan areas in Western Europe and North America.

Yamamoto (1987) has recently explained the process of change as a ceaseless destruction of regional subsystems combined with a reorganization of the country as a single spatial unit. He continued to argue that the general trend of urbanization in Japan until today has been the powerful expansion of Tokyo and Osaka metropolitan areas and the integration of the urban network under the "hegemony" of Tokyo, the capital. In this sense, Tokyo is not only the nation's preeminent city but also the world's largest banking centre and the world's third largest corporate centre following New York and London (Marlin, 1986).

IV. Network

In terms of the urban network, Taniuchi (1984) examined the structural and spatial changes in the relative status of the hundred largest urban centres in Japan from 1880 to 1980 in relation to the development of railway network. According to his study, urban development after 1880 has not seen the emergence of an entirely new system but rather a process of readjustment for the already existing system. The major changes after 1880 have been the increasing metropolitan dominance and the relative growth of the urban centres along the main spine of the Pacific coast, extending from Aomori down to Fukuoka. In the meantime, the railway network has played a role in reinforcing metropolitan dominance and further

growth of the urban centres along the main spine.

Through his research findings, we can trace the basic trend in and stability of the Japanese urban system. Taniuchi regards the distributional pattern of urban centres in 1880 as a legacy of Tokugawa Japan before 1868, since most of the centres were made up of former castle towns. Geographical change since 1880 has seen a reduction in the number of the major urban centres along the Japan Sea coast of Honshu, the mainland. The number of larger centres along the coast fell from eight to two and smaller centres decreased from 22 to 12 in contrast to the increase in the Pacific Belt as well as in the Island of Hokkaido. By 1920 when the first census was taken, the area along the Tokaido Line between Tokyo and Osaka emerged as the corridor of major growth.

After comparing maps of selected transport networks before 1868 and in the year 1983, he found the following features in the spatial pattern of the urban system:

In the Tokugawa era before 1868, a fairly well-developed transport network had already been established. Within the network the highest priority was given to the route, which had the heaviest traffic, between Tokyo and Osaka via Kyoto. This was called the Tokaido, eastern seaboard, and gave its name to the most important and the busiest railway line opened in 1889 as well as to the first "Shinkansen", a high-speed inter-city commuter line, opened in 1964. He continued to argue that a similar pattern could be found between the trunk lines of railway and those of freeway. Furthermore, same can be seen in the case of highway networks before 1868.

The car ferry routes and the airlines' networks share common features as direct links from Tokyo and Osaka to regional centres in Hokkaido, Kyushu and Shikoku. Their patterns are apparently different from the networks of freeways and railways, because of their complementary nature. However, the fact that the most important air links are those on the extended spines from Sapporo through Tokyo and Osaka to Fukuoka should be mentioned. If these network patterns are amalgamated into the single spatial unit of Japan as a whole, a nation-wide spine would emerge. Then, metropolitan dominance is shared with major regional capitals along the extended national spine while by-passing other centres. Therefore, Taniuchi concluded that it would be a matter of definition whether we should call this trend centralization along the main spine or decentralization away from the three major metropolitan areas in the core region.

The superficial property of geometric form in the Japanese urban system is readily apparent by now. The system in its broadest outline forms simple linear network focussed on the two

major metropolitan areas of Tokyo and Osaka. The spatial pattern reveals a rather narrow strip of urban development along the Pacific Coast, sometimes cited as the Pacific Urban-industrial Belt. As Bourne (1974) had already proposed in his comparative study of urban systems in Australia and Canada, the urban system can be reduced to a simple network form linking the metropolitan areas and regional capitals. This may also be true in the case of Japan's urban system.

V. Policy

Japan is now a highly urbanized country. This high level of urbanization has been achieved in a comparatively short period of time, approximately thirty years. At the same time, with falling rates both of national population growth and of rural to urban migration, the development and redevelopment of one urban area will increasingly be at the expense of another. That is, the increasing competition between cities is a "zero sum" game (OECD, 1986).

A research project by Vining and Pallone (1982) indicates that North America, Western Europe and Japan have recently shown either a reversal in the direction of net population flows from their sparsely populated peripheral regions to their densely populated core regions, or a drastic reduction in the level of this net flow. However, it may not be accurate to refer to the Japanese case as a typical example of deagglomeration (Yamaguchi, 1983). Rather it seems likely that the concentration of population will continue in the Tokyo metropolitan area at the expense of other metropolitan areas in the country. Furthermore, there now appears to be the development of four regional capitals located outside the core region of Tokaido. They are: Sapporo, for Hokkaido; Sendai, for northern Honshu; Hiroshima, for western Honshu; and Fukuoka, for Kyushu. Therefore, Japan is in the process of population reconcentration within its national, regional and prefectural capitals.

Industrial policy is also closely related to urban policy. As in other developed countries, the service sector is growing at the expense of manufacturing which still occupies a quarter of labour force. Primary sector has been declining, but the agriculture has significant interactions with urban development especially in terms of land-use in the major metropolitan areas. Since urban policy making in Japan is becoming more complex, increasing attention should be given to patterns of metropolitan migration, urban renovation and quality of life in terms of housing.

In Japan the process of urban concentration at the national and metropolitan levels has

been carried to a high degree compared with other developed countries. These are illustrated by the close proximity of the three major metropolitan areas and the high degree of densities in Japanese cities (Abe, 1984). The urban concentration had common roots in the rural to urban migration, reinforced by industrial growth policies, mainly in the 1950's as well as in the 1960's. Consequently, there has been a consistent theme in these national policies in favour of the dispersal of industrial activity, based on the concept of growth poles, in order to restrict excessive development in the major metropolitan areas. However, economic and market forces, combined with the lack of strong instruments for implementation of national plans, have tended to intensify urban concentration in the major metropolitan areas in the core region along the Pacific coast (Yamaguchi, 1986).

When the population figures are compared with the objectives of policy, it can be seen that a move towards a more balanced population structure seem to be emerging. In the period of 1975–1980, the population of all prefectures, except Tokyo with a 0.5 per cent decline, increased for the first time. Furthermore, in the period of 1980–1985, Tokyo resumed the increase of 1.8 per cent. There seem to be some signs that industrial and urban policy are now working together to achieve balance. For instance, industrial policy has changed to support growth sectors such as “high tech” industries located at planned technopolises which are seeking locations away from the major metropolitan areas.

Existing deconcentration policies will need to be maintained accompanied by a change in emphasis from the secondary to tertiary sector (Hayashi, 1986). If this is not successful, the three major metropolitan areas will become even more strongly differentiated from the rest of Japan. It actually follows another interpretation of the first component in Hino's study published in 1977. Already, Tokyo has 28 per cent of all the tertiary employment and 30 per cent of white-collar workers in Japan.

Since 1975, Tokyo has strengthened its position in relation to Osaka and Nagoya and it is particularly in the Tokyo metropolitan area that special policy measures need to be applied. Therefore, a less centralized metropolitan structure, based on sub-centres either in or near Tokyo and the growth of medium-sized towns in the broader metropolitan region, will need to be supported by investment in transportation infrastructure and social capital in the growing towns in order to make them more attractive alternatives to Tokyo (NRI, 1980).

Post-war Japan has become an urban society and the character of the society has changed. In spite of this change, a pattern of economic growth solely for the purpose of enriching the nation has delayed the development of the institutions and facilities which this degree of urbanization may require. As Fukutake (1982) had already mentioned, this

tradition continued through the post-war period and led to a policy of letting urban expansion run its natural course. Consequently, it should be remembered that economic development would not take place without proper development of human abilities and the provision of appropriate social conditions. For this purpose, a priority must be given to the consistent policy of regulating and controlling the urban growth in Japan for the sake of society rather than of economy.

VI. Appendix

The purpose of this section is to fill a gap in the knowledge of world cities by means of developing a set of urban characteristics which will facilitate the comparison of the salient nature of these cities including five major cities of Japan. Two objectives were set in the course of study. They were, first, to assemble and correlate variables and to interpret the components underlying them and, secondly, to classify cities on the basis of their component scores which came out of the analysis. The study contains the principal component analysis through which the common factors are extracted, and these component scores are used to form the basis of the cluster analysis which classifies the major cities of the world.

Urban characteristics can be described in terms of a number of demographic, economic and social attributes. Population size, demographic structure, population change, industrial profiles and housing growth are but a few of the many facets of urban life. However, in practice, the selection of 20 common variables through 30 world cities, located within the OECD countries, was determined by data available in "Book of World City Rankings" (Marlin, 1986).

The essence of the principal component analysis is to investigate how much of the total variability between the 30 cities exhibited in the 20 variables can be accounted for in a smaller number of new independent variates. From the correlation matrix, a series of equations expressing the new variates are derived. A new set of 30 values, one for each city, are called component scores. The result is the proportion of the total inter-city variance accounted for by each of the 20 components. The first component accounts for 27.16 per cent, the second for 19.96 per cent, the third for 14.14 per cent, the fourth for 9.42 per cent and the fifth for 8.15 per cent. In the remainder of the analysis, the study concentrates on the first three components which accounted for 61.26 per cent of the total variance. The proportion of 10 per cent or more of the total variance was arbitrarily set to produce principal components.

The strength of the relationships between a variable and a component is measured by

an eigenvector* between them.

Component I	
death rate (per 1000)	392
age 60 and over (%)	382
natural rate of change (per 1000)	-366
females in the population (per 1000)	353
housing growth (%)	-336
Component II	
banking centers (\$billion)	454
corporate headquarters (\$billion)	427
city population (1000)	396
regional population (1000)	388
population density per square mile	360
Component III	
birth rate (per 1000)	424
unemployed workers (%)	414
manufacturing (%)	-354
infant mortality rate (per 1000)	346
transport and communications (%)	-258

* Decimals are omitted.

The leading eigenvectors for the first component belong to variables highly correlated with demographic structure showing the stages in life cycle. The high eigenvectors associated with the second component are notably related to the urban centrality within the world economy. The third component is closely associated with industrial profiles in relation to the stages of economic growth. Accordingly, this analysis has yielded an interesting result. Demographic structure, urban centrality and industrial profiles have been shown to be very discriminating factors in urban differentiation of world cities.

Another purpose of this section is to present a rationale for an alternative approach to classification of the 30 world cities. These cities can be classified according to the three sets of values which now take the place of 20 variables. The important point of the components is that they make possible a generalized classification of 30 cities. The classification groups

together cities possessing the same combination of the signs of three types of component scores making possible eight theoretical classes. The sign indicates the direction in which the cities deviate to a substantial degree from the mean which is zero in component scores. Using six sets of component scores with plus and minus signs, the total number of existing seven scale combination is substantially enough to compare each type of classes.

+++ (old, high, post-industrial)	Paris, London
++- (old, high, industrial)	Düsseldorf, Frankfurt, Hamburg, München, West Berlin, Milano
+ - + (old, low, post-industrial)	Roma, Amsterdam, Baltimore, Detroit, Philadelphia, St. Louis
--+ (young, low, post-industrial)	Chicago, Dallas, Houston, Los Angeles, Phoenix, San Francisco, Melbourne, Sydney
--- (young, low, industrial)	Montreal, Toronto, Kobe, Nagoya, Yokohama
-+- (young, high, industrial)	Osaka, Tokyo
-++ (young, high, post-industrial)	New York

Logical division, which was chosen as a classificatory procedure, has certain drawbacks. Natural groupings or clustering of cities very similar to each other in terms of their position in the three dimensions might be allocated to two different classes. Therefore, the cluster analysis, which groups the 30 cities into a smaller number of larger sets, was adopted. The final result is presented by a dendrogram based on three sets of component scores. Figure 1 shows that several small groups combine into one large group in successive stages of the grouping process.

Decision as to which grouping stage to adopt is difficult. In this study, however, a somewhat arbitrary procedure was adopted to define a small number of reasonably sized groups. The dendrogram was retraced to step 1, at which the large majority group is merely a collection of medium-sized groups. The six groups with no less than two cities defined at this grouping stage were chosen as the nuclei of larger groups and isolates were subsequently assigned to the nuclei by the nearest neighbour method. Exceptions were made in the case of three isolated cities, such as Tokyo, Osaka and New York. Among them, Tokyo, in particular, is the last city to join the grouping tree and its uniqueness is quite evident in terms of

extremely high component scores in demographic structure (component I) as well as in urban centrality (component II) shown in Figure 2.

The analysis presented here contains no conclusive statement about world city types. Therefore, further research is needed.

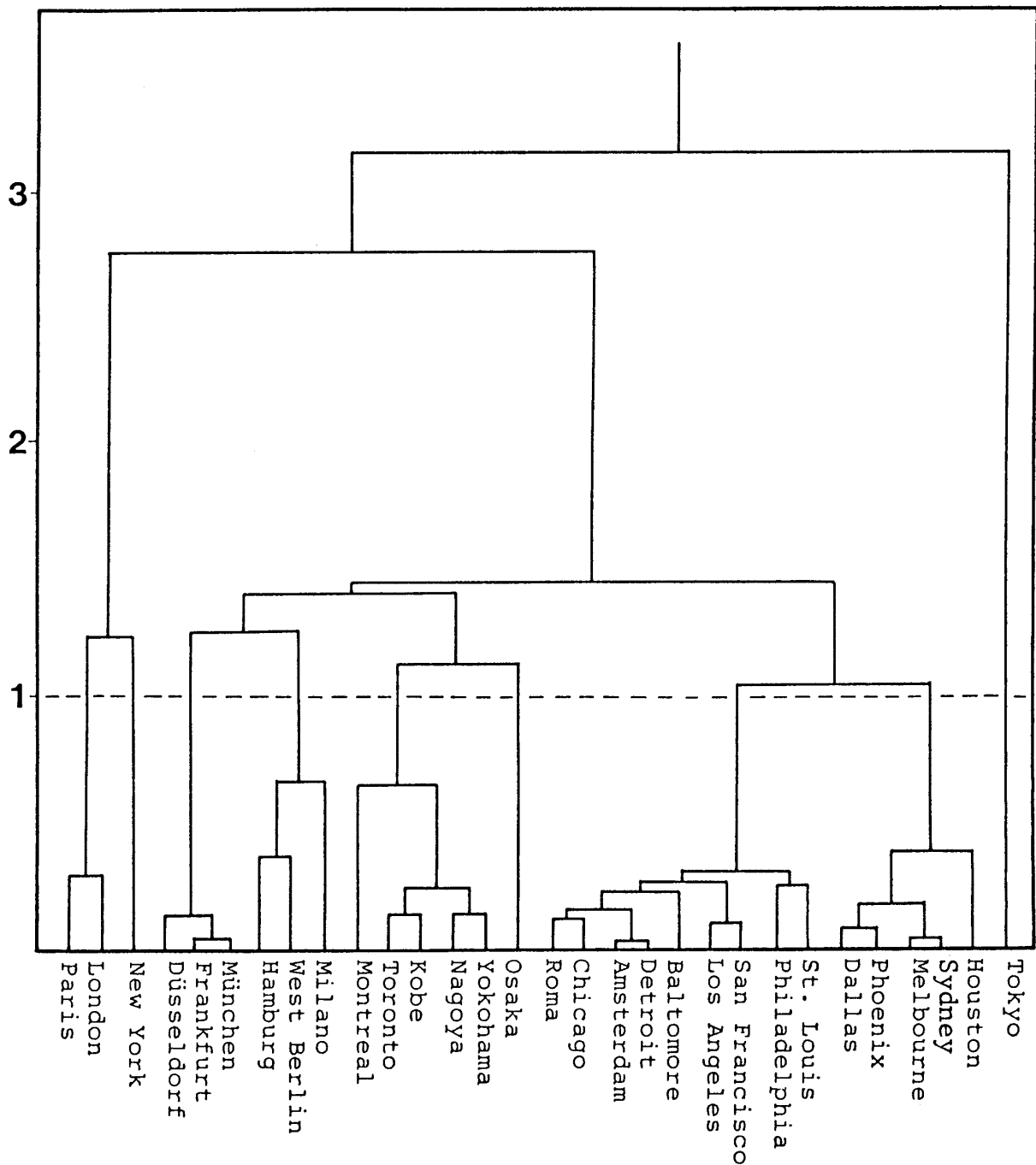


Fig. 1. Dendrogram of 30 Major Cities in the World.

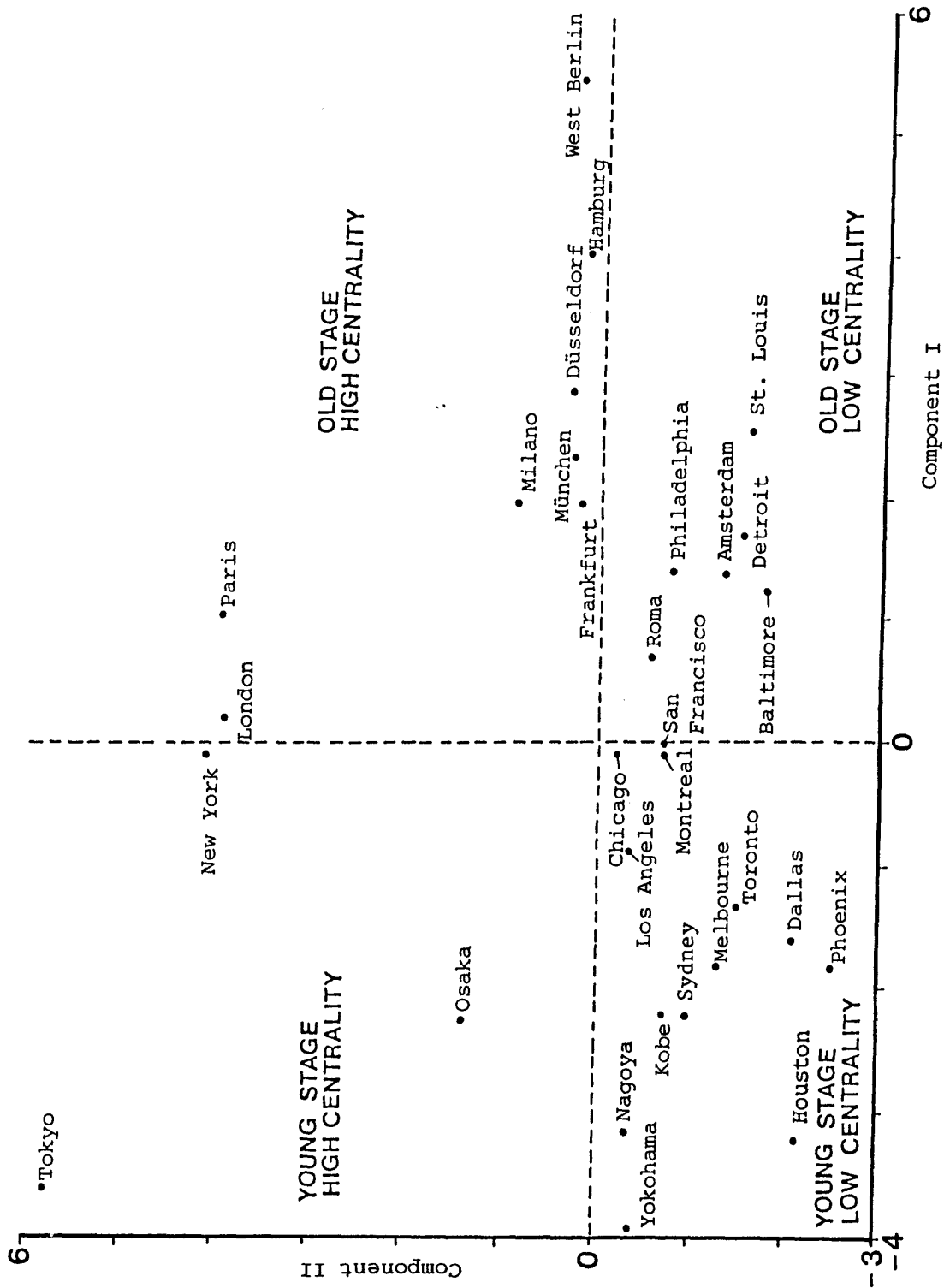


Fig. 2. Scatter Diagram between Components I and II.

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