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URBAN SOCIAL SPACE: RESIDENTIAL PATTERNS IN TAIPEI, TAIWAN: 1980

By

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ABSTRACT

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This study fills an existing gap in the geographic literature on Taiwan. Taiwan has experienced dramatic success in economic development over the past four decades. This economic success has had a significant impact on the social fabric of the country. Within Taiwan the field of geography is largely oriented toward the physical world. Little work has been done within the realm of social geography. This study helps to fill this gap by identifying the residential groupings of the city of Taipei and examining their evolution.

Since the 1960's Factorial Ecology has been an accepted framework for describing and investigating residential groupings in the city. This study uses this approach to establish the spatial structure of residential neighborhoods in Taipei at the time of the 1980 census. From the census 138 variables were selected to describe the population. Variables were gathered for the 1500 census tracts in the metropolitan area. The data matrix was submitted to principal components analysis and nine factors extracted that explain 80.6% of the common variance. While the factors extracted showed little separation between the traditional sorting elements of socio-economic status, stage in the family life cycle and ethnicity; the mapped factor scores do provide an excellent description of existing residential groupings. Historical analysis is then used to explore the evolution of these groups.

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CHAPTER ONE

STATEMENT OF THE PROBLEM

Urban Geography has developed a significant body of theory that attempts to identify patterns of residential location and explain the processes which serve to create neighborhoods. Many of these theories are embodied in an approach to studying residential patterns in urban areas known as Factorial Ecology or Social Area Analysis. The theory gives rise to a set of expectations concerning the spatial pattern of residential arrangement that is tied to residential mobility and the level of development. Broadly speaking, in countries with a reasonably developed economy and a fair degree of residential mobility, there should be discernible separation between arrangements based on socio-economic status, stage in the family life cycle and, where appropriate, ethnicity.

This study was structured to investigate the spatial arrangement of residential groups in the post-World War II era, in Taipei, Taiwan. Taipei was selected for the study for a number of reasons. It is a city that functions as a capital city, and one that tends toward primacy. It is a unique city in many ways, combining Chinese influence, Japanese influence and aspects of western influence. It is a city that embodies the entrepreneurial spirit that has enabled Taiwan to lift itself above

the ranks of the Lesser Developed Countries (LDC's) of the world. The post 1949 growth has been dramatic, and that growth was expected to be reflected in the emergence of residential groupings different from historical patterns.

The study proposed investigating the residential structure of Taipei over time. Data availability limited statistical investigation to 1980. Patterns for periods prior to that time were established using the tools of historical geography. The patterns for 1980 were established and mapped using as the framework of analysis Factorial Ecology. A comparison of historical patterns with the 1980 pattern were expected to indicate a changing residential pattern. A number of hypotheses were established that predicted the expected patterns of change. In general, it was felt that in 1980 social groupings similar to those in western cities would be distinguishable.

As mentioned the available data bases limited the focus of the study to 1980. While this limited the scope of the proposal it was decided that the study had significant value. Taipei has attracted relatively little attention by researchers, particularly those working in English. Little has been published about the development of the human landscape of the city. Consequently, the study offers a significant contribution to the literature on Taipei. In particular, it establishes the distinct residential groupings present in the city in 1980, and it sets the stage for future research along these lines.

This study proposed the use of Factorial Ecology in examining the residential structure of Taipei, Taiwan. Little has been published concerning the social groupings and their spatial distribution in this city. While a variety of qualitative assessments exist, only one article

has been published that attempts to systematically assess the area (Hsu and Pannel, 1976) and one that attempts to establish the mechanisms involved in residential moves (Wang S.C. 1981). Neither serves to adequately address the issues involved. This is significant given the growth experienced by Taipei and Taiwan since the end of World War II. Taiwan is one of the few countries to have emerged from the colonial era as an LDC and successfully transform itself into an economically successful country. Taipei has played a significant role in this process of development, and by examining the changes that have occurred the potential exists to extend our understanding of the impact of development on cities.

This study seeks to explore the current (1980) spatial pattern of residential arrangement, and to trace the evolution of that pattern over time. The remainder of the Introduction will give a brief overview of the theoretical basis of the study. Chapter Two will examine the selection of Taiwan as the study site, and of Taipei in particular. Chapter Three of this paper will delve further into the background of investigations into residential structure. It will explain the method to be employed in this study for determining the residential structure of Taipei and will set forth the expected results of such an analysis as it applies to the city. Chapter Four will present the results of the research. Chapter Five will draw together the various elements of the research process and discuss those areas needing further investigation.

THE GEOGRAPHIC APPROACH TO THE PROBLEM: THEORY AND ANALYSIS

It has been recognized for some time that cities contain an increasingly disproportionate share of national wealth in developed and

developing countries. More recently, awareness has extended to the intimate but complex relationship that exists between urbanization and national development. The urbanization process which was once seen as only the inevitable result of development is now recognized as one of the key elements of the development process itself. In short, the urban scale is an extremely important one. The city, particularly the capital or chief city of a nation, is often the focus of national life. This is true in both developing and developed nations. It serves as the principal innovator and diffusion agent. It provides the main point of contact with the outside world. It is the center of governmental activity and it is often the preferred location for industrial and commercial activity. The central city of a nation, through its place in the internal urban hierarchy, is often reflective of cities below it in the hierarchy; and of core-periphery relationships both external and internal to the nation. In the case of primate cities the hierarchy of cities may be missing; but the role of the city is even more clearly defined. It is usually the focus of the modern economy and a clear example of core-periphery relationships. The varied and vital roles the urban center plays within the nation's spatial structure makes it essential to investigate cities in order to understand the nature of the development process and the impact of such development on social structure.

The role of cities within the development process has attracted a great deal of attention. Initially, urbanization was simply viewed as a byproduct of development, or more commonly, modernization. As more attention began to be paid to the nature of the development process, however, the role of the city within the process, as an agent of

change, was identified. These earlier studies of urban centers gave rise to two major approaches for analyzing the city. The first involves investigation into the propulsive or catalytic role of the city in facilitating the development process. The second involves investigations into the internal spatial structure of the city and investigation into the way in which that structure is shaped by economic change and development.

The first perspective is concerned with the manner in which cities, and particularly systems of cities, serve to facilitate the processes of competition, integration and diffusion. This perspective springs from investigation into urban development in the More Developed Countries (MDC's) of the world. In the 1960's, a number of works appeared that classified cities in the MDC's on the basis of systems or regions. Investigators such as Perloff (1960) and Duncan (1960), building on the pioneering work of researchers such as Christaller and Losch, argued that both the national economy and the national geography of the United States could be succinctly described in terms of its urban system. These initial works invigorated the field of urban geography. By 1961, Berry was proposing a formal link between urban population distributions and the hierarchy of service centers, and linking these to the language of general systems theory. In subsequent years the nature and scope of the field of investigation was refined. Concepts such as megalopolis (Gottman, 1961), the urban field (Friedmann and Miller, 1965), the functional economic area (Fox and Kumar, 1965), and the daily urban system (Berry, 1973) extended the concept of the city within the systems framework.

During the same period, other investigators were examining the processes involved in economic development, particularly under free market economic systems. Interest in such research had been stimulated by the post-World War II breakup of colonial empires and the entry into the global economy of a multitude of independent nations that were, by Western measures, underdeveloped. Researchers such as Rostow(1960) galvanized the field. What was clear to many of these researchers was that the application of post-World War II development schemes to the LDC's was not having the desired effects, and that regardless of their success or failure the LDC's were experiencing increasing rates of urbanization. In particular, the rise of the primate city phenomenon was being noted. (A primate city being a city that is at least two times as large as the next largest city in the nation, and one that dominates all aspects of national life.) While the primate city was not a new phenomenon (for example Rome, London, Amsterdam, etc.) it did indicate problems with the spatial distribution of development. The inefficiency of Western models of development in transforming the nation was leading to changing definitions of development. Theorists and governments began to define development in terms of goals such as balanced economic development, regional equality and orderly population redistribution. A number of theorists began to reexamine the role of the city within the MDC's with the aim of extracting those elements seen as crucial in the organization of urban systems in MDC's and applying them to the LDC's in order to facilitate the spatial transformation and modernization of the LDC's. The initial general concerns were expressed by researchers such as Myrdal (1957) and led to more specific investigations by those such as Thompson (1971) and Rodwin (1970). These individuals addressed the

universal aspects of development problems and, in part, were proposing the necessity of urban systems in achieving transformation. Since then a flood of literature has appeared that analyzes various components of national urban systems along new or existing directions, and debates the policy alternatives (Bourne 1978: 9-10). Examples of this type of research can be found in the works of Cameron and Wingo 1973, Berry 1973, Hansen 1975, and Swain and Logan 1975. Basically these studies involve investigation into the manner in which the city, acting as an organizer of space, affects the development process.

The second approach to studying cities examines the way in which the economic landscape affects the internal spatial structure of the city. This type of research can be broadly categorized as falling into two types. The first type is primarily concerned with the spatial form of the city, the second with spatial processes. In both cases the search is for a regularity of pattern, be it land use patterns, population distributions or densities, density of functions, or whatever type of pattern is being sought. Much of contemporary geography rests on the assumption that there exists an inherent geographic order in human society, a spatial anatomy of human behavior and societal organization which has regular and discernible characteristics. The bulk of modern geographical research has been associated with the search for order and regularity in spatial systems (Soja and Tobin 1977: 155-156).

Much of this work, within the field of urban geography, has been concentrated on the construction of models of internal spatial structure, and have included the concentric zone (Burgess 1925), the sector (Hoyt 1939), and the multiple nuclei models (Harris and Ullman 1945). These models have been criticized over the years on a number of

points (see for example Gist and Fava 1964, Alihan 1938, Davie 1937, Gilmore 1953, or Anderson and Egeland 1961), but they are still considered valuable tools. A more sophisticated model, integrating many of the above elements was proposed in the 1970's (Hagget, Cliff and Frey 1977, Rees 1978).

One interesting point concerning these models is that they were largely developed relative to the experience of the United States. Investigations of cities in other cultures have been less extensive. The model of the colonial city and the post-colonial city have been one result of this type of investigation. These generalized models concerning cities developed under colonial systems have arisen out of various regional explorations of the structure of the city. While some are applicable only to the region in which the city is located, a significant number are relevant to other regions. These types of studies include Griffin and Ford's (1980) study of Latin American urban structure; the works of Abu-Lughod (1971) particularly those on Cairo, Bonine (1980), Aderibigbe (1975) and Hance (1970) on Africa and the Middle East; and those of Murphey (1966), Ginsberg (1965), Breese (1966, 1969) and Sit (1985) on Asian cities.

The second type of internal spatial studies has concentrated on the processes at work in the city. In essence, these writers are following a behavioralist approach. They "believe that the physical elements of existing and past spatial systems represent manifestations of a decision making behavior on the landscape, and they search for geographic understanding by examining the processes that produce spatial phenomena rather than by examining the phenomenon itself" (Amadeo and Golledge, 1975). These studies have increasingly examined the impact

that development has on the urban structure. They often operate from the perspective of a particular paradigm of developmental analysis. These methods of analysis include dependency theory, core-periphery relationships, world systems theory, Marxist theory as well as many others. The range of literature is extensive and excellent examples can be found in the works of such individuals as Harvey (1973), Slater (1977), Lubeck (1977), Roberts (1975), and Smith (1979).

This study falls within the broad context of the second type of perspective. In particular it is concerned with the internal spatial structure of the city. It seeks to combine the traditional emphasis on regional understanding and description with modern research approaches and theories that sometimes have failed to appreciate the need for regional scholarship. This is consistent with what is being called " restructured regional geography" by among others Abler (1987), Gilbert (1988), and Pudup (1988).

Systematic geographic investigation of the internal morphology of cities is of relatively recent origin. It is generally attributed to social applications of ecological work in the botanical sciences at the University of Chicago in the early 1900's. Armed with an analytical framework providing concepts such as invasion and dominance, geographers and others began to propose theories and models aimed at explaining the processes leading to the social/physical pattern of the city. Investigators such as Burgess, Hoyt, Harris and Ullman (cited earlier) and Wendell Bell (1953) were among the leaders in this type of research. In the early 1950's statistical methodology began to make inroads into the field. The advent of computers, in particular, gave rise to a wider application of multi-variate analysis in the investigatory process.

Since the 1960's, one accepted framework for investigations into the residential structure of cities has been Factorial Ecology. Urban ecology, the philosophical foundation for the approach, has become a cornerstone of the multi-dimensional research into urban structure. "Urban ecology studies the interaction between human activity and the space in which these activities are located" (Anderssen 1983: 153). The Factorial part of the approach refers to the use of factor analysis/principal components analysis as a tool to reduce a large number of variables to a manageable number of factors or dimensions, which describe various groups of residents and their associated dwelling space. Through the application of such techniques, geographers have developed a reasonably good tool for use in identifying and explaining the social/residential pattern of the city.

The early work concentrated on developed countries, particularly U.S. and Canadian cities. However a number of investigations began to made into the structure of cities in developing nations. These investigations were probably best described by Timms (1970) and Berry (1973). These researchers linked the residential structure of the city directly to the level of economic development in the society.

By the mid to late 1970's the use of Factorial Ecology had virtually disappeared. Two major reasons seem to account for this fact. First, it was criticized by geographers concerned with quantitative methods for its use of principal components analysis. Secondly, and most importantly, it was viewed as a highly useful descriptive device, but one that seemed to have little use beyond description. It provided, according to many 'an historically empty explanation'. Anderssen (1983) has demonstrated that the description alone is valuable, and that by

linking the use of the tool to regional and historical geography, our understanding of the study site, and of cities in general, can be extended. In essence what Anderssen accomplished was to defuse the arguments of those concerned with the use of principal components analysis. To many geographers this statistical method is akin to rummaging around in the data to see if any relationships emerge. Anderssen has used historical and regional geography to provide a set of expectations concerning the period under study. This ameliorates the reservations expressed about use of the method. In addition by linking the approaches the resulting explanation is no longer "historically empty".

CHAPTER TWO

TAIPEI, TAIWAN: THE HISTORICAL SETTING

INTRODUCTION

Taiwan and the city of Taipei are ideal choices for this study. Taiwan is, in the eyes of the R.O.C and the P.R.C. governments at least, a province of China. Its history as a part of China is relatively long, and as such it has developed largely within a cultural milieu that is distinctly different from western culture. It had a colonial experience, with Japan as the colonizer. Lastly, unlike the bulk of China, it has developed in the last four decades within a capitalist economic system. Within that system there has been both geographical and social mobility. Western urban theory as it relates to residential structure assumes residential mobility, and that residential location is closely associated with class as defined by income level. Distortions in the model, those not tied to physical limitations, are identified as the result of social actions, such as racism, acting on potential, universal behavior. Taiwan, having such residential mobility, meets the demands of the theories being employed.

Taiwan was a nation that by 1980 (the target year of the research) had achieved significant industrial and economic development. The per capita income of the nation was more than $2100 in 1980, a rate placing it fourth in Monsoon Asia. Real average annual increases in national income have been among the highest of the LDC's, averaging nine percent

between 1963-1973, and reaching 11 percent in the 1976-1980 period. By the late 1970's, Taiwan had become one of the top two dozen trading nations in the world. Within Taiwan there were numerous indications that the benefits of development had been distributed on a fairly wide basis. Per capita caloric intake in 1980 reached 2800/day, while per capita daily protein consumption increased from 49 grams in the 1960's to 78 grams by 1980. Statistics indicate that the nation is decreasing its consumption of rice while increasing its intake of meat, fruits and vegetables, dairy products, and cereals and pulses. Ownership of motorcycles was one in four persons, automobiles one in 23. Average living space had increased to over 128 square feet per person, and virtually all homes had television, refrigerators and telephones. (Directorate General of Budget, Accounting and Statistics (DGBAS), 1984)

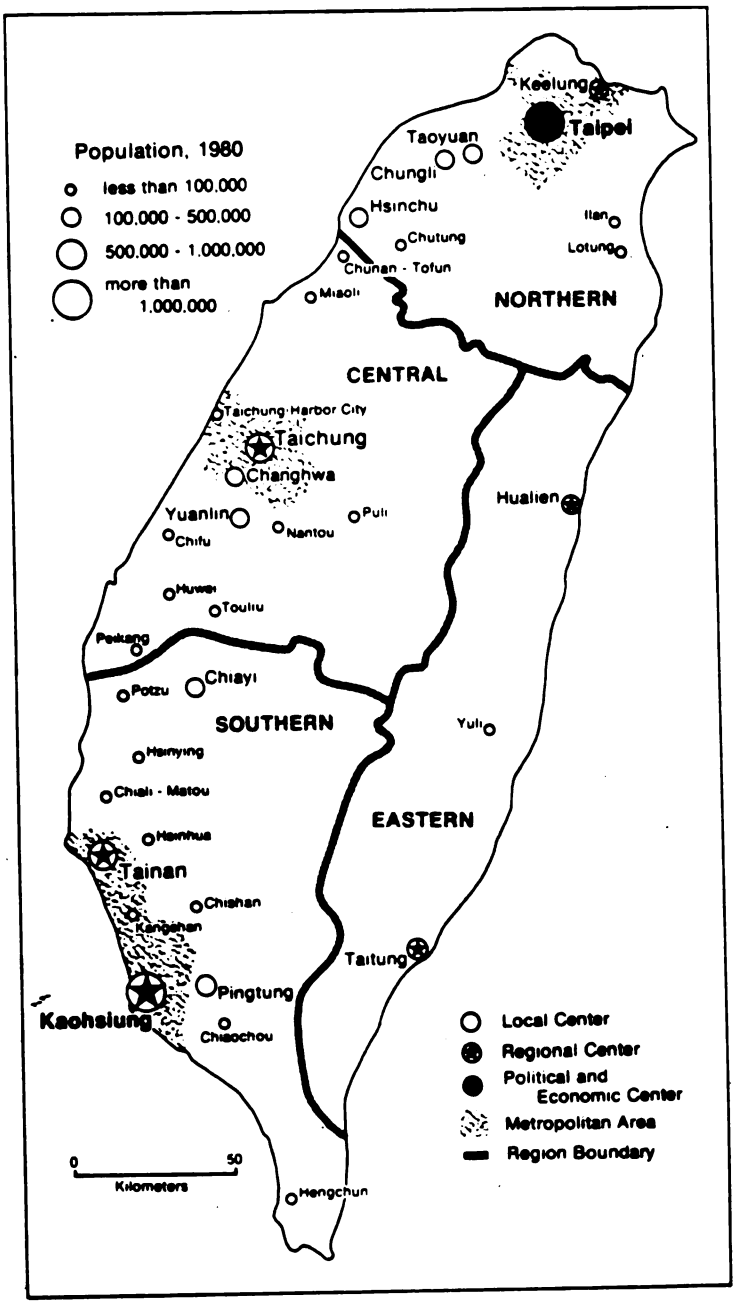
In short, Taiwan and its capital city Taipei, make an excellent choice for this study. The region combines a non-western culture and colonial experience with an extremely successful market economy. The economic system provides a commonality of experience, while the culture and colonial experience provide the unique. With this in mind, attention will now be turned to the historical development of the country.

HISTORICAL BACKGROUND

Taiwan is a subtropical island 240 miles long by 90 miles wide, lying off the south China coast at 23.30N and 122.20E. It lies in the East China Sea and is separated from the Mainland by the Taiwan Straits. (see Figure I)

FIGURE I

TAIWAN



Source: Williams (1989)

Taiwan has been within the Chinese sphere of influence for over one thousand years, and its culture and linguistic patterns have largely been determined by this influence. However, four major migrations can be identified in Taiwan. The earliest known migration to the island was by a group that is identified today as the Taiwan Aborigines, or as they are known in Taiwan, the Shan Ti Ren or Mountain People, a designation linked to the geographical regions to which they have been forced to retreat. The ancestors of these aborigines migrated to Taiwan from the Philippines some 15,000 years ago (de Beauclaire, 1971:31). Permanent settlement and culture building can only safely be placed as occurring some 5,500 years ago.(Chang, K.C. 1977:85-91) While fishing appears to have been the primary occupation, it is possible that agriculture was occurring, some one thousand years earlier than in north China. (Gates 1988:28-29)

The second major wave of migration originated in south China, particularly from the provinces of Fukien and Kwangtung. The migration of Chinese to the island took place at a much later date. It is known that migration began as early as the seventh century. Closer attention, particularly by officials of the mainland government did not happen until the sixteenth century. In 1564, in response to an increasing number of attacks on shipping and coastal settlements by Taiwan based pirates, the island was claimed as Chinese territory by the Emperor, and a garrison established near the present day city of Tainan. An upsurge in migration and eventually trade followed. (Gates 1988:28-32)

Taiwan itself offered relatively rich alluvial plains for agriculture, as well as physical proximity to the mainland. More importantly it offered the promise of land. "These motives brought a

flood of immigrants to Taiwan during the seventeenth, eighteenth, and early nineteenth centuries".(Wickberg 1981:212-213). Village building was brought as a tradition, but was also a recognized necessity. Conflicts with aboriginals grew as the Chinese influx did. Groups of migrants banded together in fortified villages for the purposes of common defense.

> "From the beginning of large-scale Chinese immigration in the seventeenth century, most peasant migrants were firmly embedded in an embryonic capitalist economy run by a class of state-aided entrepreneurs... Because Taiwan's economy was built on land speculation and exports, the use of money and the habit of calculating the costs of land, labor, and goods permeated the way of life of settlers even in remote valleys." (Gates 1988:35-36)

This sophistication continued throughout the colonial era and into the present day.

While a capitalist economy was developing under this great wave of immigration, spatial expansion and eventually city building was occurring also. The remainder of this chapter focuses on a discussion of the formation and history of urban life in the Taipei Basin. A primary source is the work on the history of the Island by Chiang and Huang (1985).

The spatial expansion of the population eventually led to the northern section of the island. Much of this area is dominated by the Taipei basin, which is an alluvial basin, triangular in shape, drained by the Tamsui River and its tributaries the Keelung, the Hsintien and the Tahan Rivers. Sometime between 1723 and 1735 the first small Chinese settlement was established on the Tamsui River. This village was named Mengchia and it was to become part of the core of the city of Taipei. The village of Mengchia grew into a market town, aided by the navigability of the Tamsui, downriver to the ocean, as well as to

interior markets. Originally much of the trade was with aboriginals. It was supplemented by commerce with the Chinese, Dutch, British and American traders located downriver in the village of Tamsui.

During the next century population in the basin continued to grow. By the early 19th century the remaining aboriginal population had been forced from the basin to the surrounding, and less desirable, upland areas. During the period from 1821 to 1850 the basic form of the city was established. Mengchia, with a population of 18,000 in 1853 was the third largest city in Taiwan, after Tainan in the south and Lukang in the center.(Chiang, Nora, 1985:191)

In the following decade conflict between rival immigrant groups resulted in the defeated group to moving downstream to the north, where they built a new market town known as Tataocheng. Meanwhile, sedimentation of the Tamsui River reduced Mengchia's importance as a port and it was superseded by Tataocheng. The opening of Tamsui port to foreign traders, as required by the Tianjin Treaty of 1860, brought more Chinese traders to the area and saw an increasing number of foreign traders. Due to the rapid silting of the Tamsui River, with a short period the whole course became unnavigable for large junks. Keelung, a deep gulf with a rocky shore, 26 km. from the inner city was selected as the trade outlet for the Taipei Basin.(Chiang, 1985:191 and Hsieh, 1964:234)

In 1887 Governor Liu Mingchuan decided to take advantage of the site advantages of Tataocheng and to develop it as the commercial center for Taipei. American, German and Dutch consulates were established, and the Ching government's efforts to develop Taiwan accelerated its growth.

The outward-oriented character of Tataocheng would eventually help to shape Taipei's development.

The third sub-city of the Taipei Basin was called Chengnei, meaning 'inside the walled city'. This area lies east of Mengchia and south of Tataocheng. It was developed some 25 years later than Tataocheng and some 70 years later than Mengchia. It basically constitutes the area lying between the two sites, and was perhaps chosen as a compromise between the existing rivals.

> This area became the focus of the new provincial government (a prefecture in 1882 and Provincial status in 1885) and in 1882 a new walled city was constructed as the administrative center. This area inside the wall was constructed along 'modern' lines with government buildings, broad boulevards, electric lighting and modern communications such as the telegraph. The emerging city of Taipei was becoming not only the political center of the province, but the communication and trade focus as well." (Chiang and Huang, 1985:188-194, Chiang, 1985:193, Hsieh, 1964:234-235)

The appearance of the walled city was significant, for this represented the ideal form of the Chinese city. The idealized form of the Chinese city is a well researched phenomena by such authors as Chang Sen-dou (1963,1970), Elvin and Skinner (1974), Skinner (1977) and Wheatley (1971). While the walled city was never fully attained in Taipei, it is important to note its nascent development. The designation as a prefecture (to be followed closely by the granting of Provincial status) was important to Taipei, and the walled city was central to the Chinese conception of urban space.

> Much of the urban character of China and East Asia was established centuries before Westerners came East. ...cities began to evolve along precise administrative and ceremonial lines. The spatial structure of the Chinese city evolved to reflect the function such cities played in Chinese society, and the spatial organization which created them. A distinctive feature of the classic Chinese city was the city wall. The wall surrounding the city was a primary defense feature, but also served as a line of demarcation between the urban and rural regions... in fact, the wall was a prime

> feature that distinguished urban centers from lower order urban places.
>
> The wall however, was only one feature of the idealized form of the Chinese city. The form of the city aimed at reflecting the Chinese view of the universe and the role of the emperor as the intermediary between heaven and earth...in reality, such as in Taipei, the ideal was seldom attained. Particularly in lower order cities this form seldom existed in totality. Topography often prevented the rectangular form. Population growth would produce spillover into suburbs. Such suburbanization often dissipated the pure form of the city, sometimes resulting in cities with several walls each enclosing succeeding rings of suburbanization. (Williams, 1983)

The walled city in Taiwan never achieved the development of major mainland cities. The first walled city on Taiwan did not appear until 1704, and there remained relatively few years before the Island was no longer under Chinese administration. Nevertheless some 43 walled cities were built on Taiwan or in the Pescadores. In Taiwan the shape of most walled towns were irregular and small in size. The largest wall, in Tainan, was only 7 kilometers in circumference. However, the major walled centers served as administrative, market, political and cultural centers. Chengnei, with its status as Prefectural and then Provincial capital, became the primary urban center. Chengnei, as was true of all walled settlements in Taiwan, grew faster than settlements without a wall. In most walled cities when the walled space was filled, the wall became a limiting factor to growth, and began to exercise a significant influence on street patterns, density and land use. This never was the case with Chengnei, first because of the 'joining' of the original three cities through growth, and secondly because of the change in ownership of Taiwan and the subsequent influence of the Japanese. In short, Chengnei never had the time to fully develop under Chinese influence,

and its siting between two existing cities was unique. (Chiang Tao-Chang, 1966:53)

The elevation of Taiwan to provincial status, in 1885, was a reflection of the growing economic importance of the province to both China and 'colony hungry' imperialistic powers. The move to keep Taiwan within the domain of China ultimately failed. The Treaty of Shimonoseki, which concluded the Sino-Japanese War in 1895, ceded Taiwan to Japan. This marked the beginning of the third significant wave of immigration to the island, that of the Japanese.

This migration occurred between 1895 and 1945, during the period of Japanese colonial rule. The colony attracted several hundred thousand Japanese immigrants. Although nearly all of these people returned to Japan at the conclusion of WW-II, their influence on culture, language and urban design and planning remains significant.

The Japan which controlled Taiwan was a radically different Japan than had existed some thirty years earlier. The Mejii restoration in Japan had come about as a result of a new alliance between the Samurai class and that of the merchants. In the thirty odd years between the restoration and the colonization of Taiwan, Japan had undergone dramatic change. The society had transformed itself from a technologically immature, feudal, agricultural nation, into a strongly centralized and rapidly developing country that was successfully contesting with western nations for influence in the Pacific basin. Japan was driven by many of the same factors that drove western colonial nations, in particular the need for both raw materials and markets. Taiwan became not only a source of raw materials and goods and a market for Japanese produced items, but a demonstration project aimed at showing western powers that Japan had

arrived. This attitude was clear in many of the writings of the day. For example, Yosaburo Takekoshi, a leading historian of Meiji Japan wrote in the introduction of his book about Taiwan, "The white people have long believed that it has been the white man's burden to cultivate the uncivilized territories and bring to them the benefits of civilization. The Japanese people now have risen in the Far East and want to participate with the white people in this great mission." (Takekoshi, 1907:iv.)

The Japanese government and industrialists worked hand in hand in developing a wide range of projects largely based on local raw materials. "While business profits went mostly to Japan, much of the tax collected in Taiwan was spent there on the infrastructure and administration that had made increased productivity possible. For the Taiwanese peasants, life became much safer, healthier, a bit more comfortable." (Gates, 1988:41)

The Japanese made the emerging city of Taipei the colonial capital. The Japanese were strongly influenced by the more technologically advanced West, and envisioned a showplace city in the western tradition. (Chiang, 1985:195) In 1898 the Japanese government created a city planning committee. It proceeded to demolish the city wall (although the gates were kept as historical landmarks) replacing it with a three lane highway, and expanded the old city of Cheng-nei westward and connected it with Meng-chia (soon to be renamed Wanhua) and Tataochen. Transportation links were also improved between the central city and both Yang Ming Shan and Peitou to the north. Yang Ming Shan functioned much like the hill stations or residences of the British in India. It offered the Japanese elite an alternative residential location

for the hot, steamy summer months in the cooler higher elevations, but still within reach of the commercial center. Peitou, with its hot springs and sulphurous mud baths became a favored retreat.

In 1905 the Japanese established the first large scale city plan for Taipei. The plan incorporated the original three villages and surrounding territory into a 1,000 hectare city with a planned population of 150,000. (Chiang and Huang, 1985:195) Although the city plan envisioned a 1,000 hectare city, actual development was concentrated in the old inner city area of Cheng-nei where the colonial government and Japanese population were located. In this district were built government and financial institutions (in Meiji style architecture) and a new commercial center arose in the area fronting on the central railroad station. To the east of the original core, high class residential districts for the Japanese(largely consisting of traditional Japanese style houses) were established. The native Taiwanese were largely confined to the remaining districts, in a pattern that saw complete mixture of social classes as well as land uses. All of this activity was facilitated by the typhoon which struck the Island in 1911 and destroyed much of the native housing. This native housing, built of brick and clay, was replaced with construction of concrete and steel, in the western style. (Hsieh, 1964: 235)

> "Population growth exceeded the estimate [made in 1905], and by 1913 the target population had already been reached. In 1904 Taipei was the largest city in Taiwan with a population of 85,890. In 1932 the population of Taipei had reached 281,852 and a revised city plan was announced which envisaged a population of 600,000 by 1955. The city limits were expanded to include a total area of 6,676 hectares (66.76 sq.km.), with the inner city as the focus. A modern road system was drawn into the plan. The Taipei City Plan Act was issued in 1936 in order to implement the above plan, and this was the beginning of city planning legislation in Taiwan. However, a lack of balance could be detected in the plan: development efforts were concentrated in those areas

> populated by Japanese, while Taiwanese populated areas were more or less ignored." (Chiang and Huang, 1985:195)

By the end of the Japanese colonial period much of the character of present day Taipei was set. On a macro-scale the gridiron pattern of streets was in place. While on a micro-scale this is often not apparent, with land use and space combined to an extent not apparent in the West, and patterns often having no regularity as a result of the presence of older sections of the city or areas where development was done with little regard for plans, the overlying pattern is still the gridiron pattern of Japanese colonialism. In large part the Japanese plans still dictate growth and patterns as one author states "Even today, Japanese colonial structural plans are being followed in the layout of road networks, parks and public lands, and drainage systems in many towns and cities". (Pannell, 1973:4) Beyond the physical layout of the city, social institutions, law, education, in fact the full spectrum of life had been influenced by the Japanese. Certainly the Meiji style of architecture dominated the core regions of the city, and traditional Japanese style houses the upper-class residential areas. But more importantly, the city reflected a blending of styles and cultures that still impacts today.

But it must be noted that the style, while having similarities to Japan and to other cities in the region, was unique. Much of the physical layout of the cities was apparent in Japanese cities of the modern era. The newly developing parts of Tokyo, to the North, West and South, reflected many of the same characteristics in building style and gross pattern. However, the population of Japan has always been almost entirely Nipponese. In Taipei the two ethnic groups were separated, both socially and geographically (at least at the upper levels of society).

This, of course, was not evident at the same scale, in Japan. In addition, by the 1930's Japan was exhibiting a residential pattern as diverse and identifiable as the one in U.S. cities of the same period. Social and residential groupings were clearly identifiable. (Ueno, 1985) This was not the case in the ethnic Chinese neighborhoods in Taipei, where indications are that residential groupings were largely undifferentiated, as least as regards income or stage in the family life cycle. (other mechanisms may have been at work. This is discussed later in the paper;also see for example Gallin and Gallin, 1974)

The end of the Second World War in 1945 saw the beginning of the last great migration to Taiwan. October 25, 1945, known in Taiwan as Retrocession Day, marks the return of Taiwan to Chinese control. The mainland of China was in transition at the time, from a war primarily with the Japanese, to a resumption of the civil war between the Nationalists (Kuo Min Tang or KMT) led by Chiang Kai-shek and the Chinese Communist Party (CCP) under the leadership of Mao Tsetung. At the time of Retrocession the Nationalists were the recognized legitimate government of China. As such control of the Province passed to them. In December of 1945 troops dispatched by Chiang, and led by Chen Yi arrived to garrison the island. Analysis of the period immediately following the war depends upon your point of view. It is generally agreed that the arriving troops were initially welcomed. The welcome however was short lived as the troops began to run rampant over the Province in an orgy of looting, stealing and raping. Some historians feel that the Taiwanese were treated, in the words of one recent historian, as 'slaves without a country'. (Shi, 1979: 706). Other historians view the actions, for the most part, as justified, particularily as many of the largely peasant

army saw Taiwan, with its recent Japanese history, as hostile territory. In any event, sharp divisions between the Taiwanese and the newcomer Mainlanders soon occurred. Tensions became so great that on February 28,1947 (known in Taiwan as 2:28) the Taiwanese, led by the middle class that had arisen under the Japanese, revolted against the Mainland presence. The revolt was short lived, a fact that was the result of the superior military might of the Mainlanders, as well as promises of redress made to the Taiwanese. The cessation of hostilities by the Taiwanese did not mark the end of the incident. To firmly establish their control, the forces led by Chen Yi quickly rounded up between ten and twenty thousand Taiwanese. Those arrested tended to be the liberal, educated, and generally pro-Japanese middle class. These people were executed by the Mainland forces. Divisions between the two groups were now firmly established. They were further deepened in 1949 and through the early 1950's. In 1949 the KMT were defeated by the CCP forces on the mainland. Chiang Kai-shek and the remnants of his forces, (upwards of one to two million individuals) retreated to Taiwan. The arrival of the defeated KMT forces resulted in widespread confiscation of land and deep social cleavages. The distance between the Taiwanese and Mainlanders was further complicated as Chiang consolidated his position on the island by insuring that any remaining potential threats to his political position were either eliminated or rendered ineffective.

The arrival of the Mainlanders brought deep social divisions to the island. Also at peril with their arrival was the economy, which was already devastated by normal wartime inflation. This was further complicated by the fact that a yen based economy was being forcibly recast into the Chinese system. The conversion to the Chinese system was

complicated by the fact that little faith remained in currencies being issued by the KMT which was notorious for the inflationary printing of money to pay its debts. "Between the wartime inflation of Japanese money and the unprecedented Nationalist expansion of currency, staple foods that cost one yen in prosperous prewar 1937 cost 72,262 units of Chinese currency by May 1949, and building materials inflated from one unit to 93,563 over the same period. Between January and June of 1949, the cost of living rose ten times." (Gates, 1988, 51) If this was not enough other complications existed. The retreat to Taiwan was seen as temporary by the KMT, it was not expected to last any longer than it took to regroup and then regain control over the mainland (still the official policy of the Government). As a result of this policy, the KMT continued to field an extraordinarily large military force. Much of the Government revenue from both domestic and foreign aid sources went to support this structure through at least the beginning of the 1960's. This put extremely strong inflationary pressures on the economy. The state of the economy was further complicated by the inefficient and sometimes crooked management of state run enterprises (monopolies) in such commodities as rice, sugar, oil, tobacco and liquor; as well as by the destruction of the native Taiwanese middle class of entreprenuers.

Under pressure by the Americans, Chiang agreed in the early 1950's to institute a land reform program long sought by some elements within the KMT. This reform, completed by 1953, restricted farmland ownership by individuals to three hectares (7.2 acres). Land over this amount was bought from the owner and sold to families having less than the prescribed amount of land. The former owners of the land were not paid in cash but in government securities or stock in state run enterprises

(thus not only conserving capital, but also avoiding the potential for problems if currency in which people had little faith were forced upon them); new owners were allowed to finance the land by accepting ten year mortgages at an annual rate of 37.5% of its annual crop value.(see Chen 1961, Yang, 1970) In the short term this move did improve the lives of the rural dwellers. Production of agricultural products increased and capital was created. Surplus capital was reinvested in the farm or in off farm enterprises. By the end of the 1950's some improvement had been seen in the economy. However, the land reform also had unanticipated results. The small size of the farms restricted mechanization. This meant that family labor continued to be the most important input into the farm. This combined with improved health care and diet led to high growth rates for the population. Much of this population soon became surplus to the rural economy, constrained as it was by a finite amount of land. While this surplus labor was to form the basis of Taiwan's transformation to an industrial nation, it also created many new problems as labor left the countryside to seek opportunities in Taiwan's cities. When Retrocession occurred in 1945, Taipei first reassumed its status as a provincial city. However the provincial capital was soon moved to Tainan and the city became the 'temporary' capital of the Republic of China (R.O.C.).

At the time of the coming of the Mainlanders the city consisted of ten administrative districts covering an area of 66.98 sq.km. Post war city planning for Taipei began immediately after the war, in 1945. "Based on the 1932 plan, with very few adjustments, five land-use types were distinguished: residential, commercial, industrial, agricultural and mixed. By 1954, 43.9% of the total planned land had been put into

use." (Chiang and Huang: 1985:196) Between 1954 and 1967 Taipei continued to grow. Fueled by the surplus labor from the countryside, as well as by natural increase, the city grew rapidly. Not only did the city grow, but the surrounding cities and townships did also. The territory lying west of the Tamshui River, cities such as Sanchung, also experienced rapid growth. At the height of the Japanese period, in 1944 the population of Taipei had reached 401,497. The immediate postwar period saw a dramatic decline in the population as some 100,000 Japanese were repatriated. The influx of Mainlanders, however, soon made up for this loss, and by 1950 the population had reached 503,450. From 1950, until the late 1970's the population expanded at over 5% a year. Since that time the rate has hovered around 3%. At any rate, by 1963 the population of Taipei had reached one million in the city proper and close to two million in the metropolitan area (Williams, 1988:177). This doubled during the following ten years.

The growth of Taipei was reflective of a major residential shift occurring nation wide. When Taipei became the 'temporary' capital of the Nationalist government, Taiwan was primarily an agricultural society. In 1950, only about 25% of the population of the island lived in urban places. Williams, 1988:177) During the following decade the population of the island increased to 10.8 million (DGBAS, 1980). In the same time period land reform began to raise rural incomes, and industrialization began a sustained period of explosive growth. The labor to fuel the push to industrialization came largely from rural to urban migration. This migration process is well documented by researchers such as Tsai (1986), Liu, P. (1982, 1983), Tsay (1982), Chiang (1984), and Speare (1973, 1974, 1988). The migration from rural areas in the 1950's on had as its

destination the large cities and their satellites. The Taipei Metropolitan Region was the destination of many of these migrants, leading to explosive growth. "For example, Panchiao, Yungho, Sanchung, Chungho, and Hsinchuang, all satellite cities of Taipei, experienced explosive growth. Chungho alone increased 1300% from 20,000 in 1956 to nearly 300,000 by 1982. Panchiao swelled 967%, Hsingchuang 851%. (Williams, 1988:180) By 1980, 66% of the population was urban.

This growth in urban residents and in the residents of Taipei however is not attributable only to migration or natural increase. In 1967 Taipei was elevated to the status of an Executive Yuan (Council) administered city and its borders were redrawn to include sixteen districts and a total area of 272.14 sq.km. At the time of the boundary changes the population was 1,604,543. In the 1980 census the city had a population of some 2,267,584 in the city itself and about twice that number in the metropolitan region. (Chiang and Huang, 1985:195-199)

This growth in population is reflective of the economic transformation of the country. The Taiwanese economy which had been stagnant in the 1950's finally began to take off in the early to mid 1960's. This dramatic change within the economy was due to a variety of factors. Changes in domestic leadership as well as fears of being surpassed by the then plausible gains of the 'Great Leap Forward" on the mainland were certainly factors. Equally important was a boom in foreign investment attracted by KMT assurances that Taiwan offered not only cheap labor, but labor that was forbidden to strike. This foreign investment was further attracted by the establishment of export processing zones which served to maximize their profits while giving Taiwan the benefit of the transformation of an agricultural workforce

into an industrial one and providing wages to stimulate the local economy at the same time. In any event Taiwan soon established itself in such export sectors as textiles, footwear, plastics and electronics, particularily to the U.S. with which it had Most Favored Nation (MFN) status. The final push that took Taiwan from the take off stage into a developing economy came with the Vietnam War. Taiwan greatly benefitted from production contracts for military goods, repair facilities, building products sales, increased U.S. military presence, as well as being a major R&R site for American troops. The money generated by these activities created a tremendous pool of capital, which when combined with the entrepreneurial skills and hard work of the Taiwanese, provided the means for Taiwan to join the ranks of the Newly Industrialized Countries (NIC's).

It has already been seen that population in Taipei grew dramatically as a result of economic changes in the society. During the postwar period Taipei also saw dramatic changes in other areas. The ethnic makeup of the city also changed significantly during this period. During the colonial period, immigration from the mainland of China to Taiwan was severely restricted. Thus Chinese inhabitants of Taipei largely consisted of those whose ancestors, or who themselves, had moved to Taiwan prior to 1895 (this is the group that is today known as the Taiwanese). This group accounted for some 65% of the city in the pre-war period. Japanese accounted for 25-35% of the population, while the remainder consisted of Chinese mainlanders, those who had moved to the country after 1895 (and who tended to be urban dwellers, given the lack of available land in the rural areas). The postwar period saw the repatriation of the Japanese, whose place was soon taken by the

retreating mainlanders. By 1950, mainland Chinese made up one third of the city's population. As the city expanded, a new group became a significant sector of the population. The rural to urban migration fueled by rural birth rates and labor surpluses, as well as by increased urban opportunity, saw the rural migrants account for 35% of the population by 1975. (Chiang and Huang, 1985:190-198) (DGBS, Various years)

The population and areal expansion of the city were accompanied by significant changes in population densities as well. In general there has been an increasing outward movement, or suburbanization, of the population. Aging housing in central districts, combined with increased land values has prompted many to move to outlying districts or to satellite cities within the metropolitan region. This movement has been facilitated by improved transportation networks, as well as by the dramatic increase in privately owned motorcycles and cars brought on by economic success.

The outer suburbs and satellite districts are also the destination of many migrants. Shut out of the center city by high land prices, they are forced to compromise, often living far from work in order to obtain reasonably priced housing. This urban sprawl with its changing density gradients was first reported in a study that theorized that urban population density gradients for Taipei exhibit patterns characteristic of Western cities. This was a hypothesis that reflected the growing transformation of the city. "Unlike some Western cities, Taipei...was not structurally formed around a purely commercial central business district. Instead a primary commercial-cum-residential area which performs the function of the western central business district developed

with a juxtaposition of shop and residence ... primarily due to traditional business organization...(which is)...small in scale and owned, managed and operated largely by members of a single family" (Liu, 1986: 5) This traditionally led to extremely high densities in the central city area. In any event, the study found that from 1950-1972 the density gradient slopes declined continuously throughout the study period, and the central densities first increased and then decreased. (Graff, 1976) The trend towards suburbanization was reaffirmed by a study that demonstrated that high growth rates occurred at a distance of 5 km. from the city center from 1963-1968, at 6.5 km. from 1969-1974, and 10.5 km. from 1975-1979. (Chen, 1981)

Unfortunately, few urban or social geographies, or even a comprehensive description of the modern metropolitan region exist. The most current description of the city is contained in a map of land use patterns for the city as of 1983. The map includes historical and regional maps as well as a textual discussion of land use in the Taipei Basin. (Williams, Sutherland and Chang, 1988). While Taipei is a major metropolitan region, it has attracted relatively little notice in the literature outside of Taiwan. The best sources on the city are Chinese language sources published by scholars in Taiwan. Unfortunately, many of these are uncirculated research or technical reports which do not reach a large audience. Some of the more valuable ones are included in the Bibliography. Beyond that one must depend on English language sources, and luckily many Taiwanese do publish in English, and most Chinese publications include an English language abstract. However, as stated, the literature in English or Chinese is not that extensive.

Even though the range of the literature is limited, there are a number of studies that do have bearing on this one. Clifton Pannell's (1973) study of Taichung City in Taiwan provides a good overview of the development of a major Taiwanese city; especially of the influence of both traditional Chinese styles and Japanese colonialism. Pannel (1974) has also contributed to the general understanding of urban land consolidation and city growth in Taiwan. This aspect of urbanization was also addressed by Lin (1980). The operation of the real estate markets in Taiwan, and the development of urban housing has been addressed by Lee (1979), and Hsung-Hsiung Tsai (1988). Population distribution, structure and migration have been the focus of a number of researchers. Among the more notable authors who have delved into these phenomena are Speare (1973, 1974), J.L. Li (1983), and Li and Tsai (1988). Economic development and labor migration are important elements in the growth of urban areas. This process has been the focus of Paul Liu (1979, 1982, 1983), Speare (1974), Hong-chin Tsai (1986), and Sun and Tsai (1980). Lin Tse-t'ien (1973) has written on the development of industry and cities in Taiwan; while Li Jui-lin (1973) has contributed significantly to understanding the structure and development of Taiwan's cities. The recently published book by Speare, Liu and Tsay (1988), provides a good overview of the rural to urban transition that Taiwan has undergone over the past several decades. The development of urban and regional planning has drawn the attention of Lin Tsu-yu (1973), C.Y. Wang (1988) and Williams (1988).

Taipei itself, as mentioned, has drawn limited attention. Among the studies that bear on this work are Li Hsun-feng's (1983) analysis of industrial land in the Taipei Metropolitan Area, Chin-lung Tsay's (1982)

investigation into migration and population growth in the city and Ya-mei Chiang's (1984) look at migration and residential decision making in the suburban city of Sanchung. Several studies have a direct application to this work, in helping to establish current patterns and behavioral processes. Among these are Hsueh-tao Chien's (1976) study of the structure and distribution of commercial areas in the city, Tou-chin Lin's (1983) look at the process of industrial location in the city, Jing Meng's (1982) research on the spatial variations of population growth and distribution, and Hsu and Pannell's (1978) investigation into the residential and social structure of the city.

The best overall source of material on all aspects of Taiwanese history and life (in English) is the comprehensive bibliography on English language publications compiled by Bruce Jacobs (1984).

Within the broad context of urban research on Asian cities, studies that apply to Taipei's situation are also sparse. The best and most comprehensive study of traditional Chinese urban form and structure is, without doubt, Paul Wheatley's (1971) landmark work on the origins and character of these cities. Tao-Chang Chiang's (1966) study of walled towns in Taiwan provides a geographic perspective on the distribution and realization of such urban forms in Taiwan. Another valuable source on gaining a broad understanding of Chinese urban form and experience is the three volume study of Chinese cities by Skinner (1971,1974) and Elvin and Skinner (1974).

In terms of systematic investigation into urban growth and structure, and attempts at theory building, the best work has been concentrated in South and Southeast Asia. The most extensive work with

applicability to Taiwan has been done by T.G. McGee (1967, 1971) who has investigated both the urbanization process in the third world, as well as in Southeast Asia in particular. Before examining the applicability of Southeast Asian urban models it is important to reiterate that the primary influence on urban development in Taiwan was (and to some extent remains) Japanese. "Morphologically and in physical design, the larger cities are in part Japanese. Even today, Japanese colonial structural plans are being followed..." (Pannell, 1973:4). Pannell and others have found McGee's Southeast Asian models of some use in understanding Taiwan's cities, but the differences far outweigh the similarities. Up until relatively recently the major cities of Southeast Asia developed along the lines of what McGee termed "the colonial city in Southeast Asia" (1967). These colonial cities emerged in the nineteenth century and were for the most part, port cities having a variety of functions. McGee describes them as the "...foci of colonial control and domination. They were also administrative, processing, and transportation foci, but it was largely their economic function as the focal point for the collection of raw materials and the distribution of imports and exports which led to their massive growth and dominance in the urban hierarchy which persists today" (1967: 22). It is clear that no city in Taiwan has dominated the economy and urban hierarchy of the country in the same manner as does these Southeast Asian cities. (Pannell, 1973: 5) "Although Taipei is without question the key urban center, there is in fact a relatively balanced hierarchy of secondary and tertiary cities below Taipei, in a pattern that is close to normal rank-size distribution." (Williams, 1988: 179) In addition Taipei never really functioned as a major port city, delegating that role to the city of

Chilung located about 15 miles to the northeast. While Taipei was the center of Japanese colonial administration and an important commercial and industrial center, it shared its economic functions with both Chilung and Kaohsiung (in the south). In addition, the Japanese were late entries into the colonial picture and never fully developed the commercial aspects the way other countries did (Pannell, 1973: 5). Finally, it must be noted that when the Island was returned to the KMT at the end of WWII, the Provincial capital became Taichung. While Taipei eventually became the focal point of the national government, all governmental functions were not focused in one location. This decentralization of functions is important, for administrative and military functions appear to have been major determinants of urban growth since the Japanese period. For example during the colonial era the city of Taichung grew much more rapidly (and eventually surpassed) its central Taiwan rival Changhua, the traditional commercial and transportation center in the region (Pannell, 1973: 5).

While it is true that Japan exploited Taiwan for its primary products, in much the same way that occurred in Southeast Asian cities, and invested little in the industrial sector (Barclay, 1954: 18-42), the situation is different than that described by McGee (1967). McGee sees Third World countries, and Southeast Asian nations in particular, as having "inherited their economic structure from an era of colonialism characterized by an excessive specialization in the production of materials for the industries of the metropolitan powers. (And) Despite independence,... still closely linked and dangerously dependent upon the industrial powers..." (McGee, 1967: 22). While it has been stated that there are similarities, Barclay (1954), among others, makes it clear

that Japanese investment in the transportation and power sectors set the stage for both industrialization and a more balanced regional growth. (Barclay, 1954: 18-42), (Pannell, 1973: 4-7).

McGee (1967, 1971) has also described the explosive growth in Third World urbanization. This growth is seen as occurring as a result of both natural increase and in-migration. On the whole McGee felt that natural increase was the largest contributor to the rapid growth of urban areas. While rural to urban migration is occurring in very large numbers; McGee felt that such migration merely raised the level of growth in the city to the equal of that in rural areas (McGee, 1971: 35-58). In addition, the rapid growth of population created an ever increasing under-class in the rural areas that in the future would push rural dwellers toward the city as lack of opportunity in the countryside increased. The failure of industrialization in the city would then mean the city could not adequately absorb these residents and particularly not in addition to those born in the city (McGee, 1971: 35-58). Lastly he felt that any growth in the middle class would not serve to more fairly distribute income, but rather serve to concentrate it even further (McGee, 1971: 35-58).

The Taiwanese experience has been much different than that described by McGee. Even with the colonial experience, and the influx of the Mainland Chinese after 1949, only 25% of the population lived in urban places (Williams, 1988: 177). "In the 1950"s, however, island-wide urbanization began to take off as a result of industrialization..." (Williams, 1988: 177). During the 1950's the island's population grew by 4.4%, but urbanization increased at an annual rate of 12.6%; obviously rural to urban migration was playing a significant role in urban growth.

This is confirmed by the experience of the 1960's. During this decade total population growth slowed to 3.2% a year, while urban growth continued at a rate of 8.8% a year. By the 1970's the country's population growth rate had slowed to 2.1% a year, while cities continued a relatively high growth rate of 5.1% a year. By 1980 some 66% of the total population lived in cities (Williams, 1988: 177-179). As cities were growing much more rapidly than the nation as a whole it is obvious that rural to urban migration has played a vital role in city growth. In addition McGee cites Davis's (1965) contention that under-developed countries gains in the proportion of urban population was 20%, compared with an average gain of 15% for industrialized countries during the decades of their most rapid urbanization (McGee, 1968: 17). The rates in Taiwan place it much closer to the Western experience that the general experience of the Third World. Taiwan, in fact, has experienced what has been described as an 'orderly urbanization' (Myint 1981; Liu 1979, 1983; Li 1983; M.C. Chang, 1984; Williams, 1988).

Unlike the situation described by McGee, Taiwan's rural sector has not become a persistent under-class. In the earlier years of urbanization Taiwan did experience a widening gap between rural and urban incomes; an experience heightened by the fact that most migrants tended to be young people. By the late 1970's, as a result of direct government action, the outflow from rural areas had declined (Williams, 1988: 181). Even with the rural-urban gap in incomes it is opportunity, not poverty, that has led to much of the migration. "...rural-to-urban migration in Taiwan has not been the result of real poverty in rural regions but rather a response to better employment opportunities in cities. Taiwan thus differs significantly in this regard from most other

developing countries. The majority of migrants were better educated young adults of both sexes" (Williams, 1988: 181).

Taiwan has also not experienced an ever increasing gap between a large under-class and small middle and upper class as described by McGee. In fact, "Taiwan has managed to achieve a fair degree of social, as well as spatial, equity in the distribution of its wealth" (Williams, 1988: 175).

The last element of McGee's model that on the surface seems to have applicability to Taiwan is the residential pattern. McGee describes cities that generally were made up of an indigenous minority, a small Western colonial upper class of administrators, and a large middle group of laborers, commercial people, and petty administrators from other regions of Asia. He describes these groups as clustering in ethnic quarters, with interaction determined by commercial linkages (McGee, 1967: 52-75). This is a view that was upheld by Berry and Rees (1973) in their investigation into Calcutta. Taiwan's experience was quite different. As Pannell notes:

> "...in Japanese dominated Taiwan, while there existed enclaves of mainland born Chinese or other nationalities, the colonial cities and towns were basically composed of two groups-native Taiwanese... and Japanese colonials most of whom were expatriate administrators, professional, or commercial types. Between the two groups distinct social cleavages emerged mainly based on wealth, status, and privilege,... Undoubtedly, while certain exclusive enclaves of Japanese citizens existed, there was also considerable contact and interchange among lower income Japanese who could not afford that luxury of living in the Japanese quarter and the indigenous Taiwanese. Indeed the evidence from Taipei, which indicated that many of the city's administrative districts had a Japanese population of between 10% and 50% of the occupants would suggest more association among the groups than is generally conceded. and there occurred much mixing at a lower income level among the various national groups. On the other hand, in the Southeast Asian city, the Asian groups were economically associated to some extent, but the colonial European group was sharply segregated...The conclusion may be that the

> ethnic element was less conspicuous in Taiwan...whereas in Southeast Asia, not only were several national groups involved, but several racial groups as well, and the percentage of purely colonial Europeans was indeed a very small percentage of the total" (Pannell, 1973: 43-45).

In short then, the experience of Taiwan is very different than that experienced by Southeast Asia and much of the rest of the developing world. While McGee's model offers a useful foil and comparative device, it does not explain the development of Taiwanese cities. At the same time the view of Reissman that "industrial urban development in the West and in the underdeveloped countries today is the same process although greatly separated in time and place" (Reissman, 1964: 165-166) does not fit either. While Western experience can shed light on the development of Taiwanese cities, the colonial experience and Chinese culture add elements that make the experience different and perhaps unique.

CHAPTER THREE

THE THEORETICAL AND ANALYTICAL FRAMEWORK

THEORY AND THE CLASSICAL MODELS

Investigation into the spatial patterns and processes of urban areas has a relatively long tradition. In the mid-nineteenth century, Kohl (1841; in Berry and Kasarda, 1977:108) devoted an entire chapter to the internal structure of the city. Urban structure, he felt, might be viewed vertically as a series of layers with the ground floor containing businessmen, the first floor, areas of wealth and pleasure, and the upper and subterranean levels having the lower income residents.

Kohl's observations were a precursor to a whole body of work dealing with the spatial structure of the city. However, it was not until the 1920's that significant work in this area began to be produced. Inspired by the work being done in plant ecology at the University of Chicago, a number of researchers began to examine urban spatial structure from an "ecological" approach. Robert Park in his essay "Human Ecology (1936) illustrated the nature of this approach. He talks about "competition" between various populations in the metropolis, the "dominance" of one group or another in the functional areas of the city, and of "invasion" of the area by competing groups and "succession and dominance" by the new group. These urban ecologies, Park felt, result from population increase, and were expressed in a series of concentric rings around the city that formed over time. Based on

empirical observation of the city of Chicago, he identified a process of social mobility involving geographic mobility, wherein the longest term residents would move from core areas to the periphery of the city, and new in-migrants would fill the abandoned areas.

This process was given formal statement by Burgess (1925) in his concentric zone model. "The model is crude and unrefined, but it provided a set of ideas about urban spatial structure which could be empirically tested, and a framework for more detailed study of natural areas within the city" (Berry and Horton, 1970:307). The studies that were produced in initial reaction to Burgess' work, focused on the "disorganized" communities of the city and the real and immediate problems of poverty and deviant behavior posed by such residential areas. These studies postulated a number of reasons for the persistence of certain neighborhoods in producing social problems. Burgess himself was led to postulate a correlation between mobility and individual behavior as being of central concern. "But he missed the point of his own model of the city. The movement of people from one residence to another as the city grows is the very mechanism by which the zones and natural areas are created" (Berry and Horton, 1970:307). An alternative explanation was provided by Louis Wirth (1938). Wirth felt that size, density, and heterogeneity were the key elements needed to explain social disorganization. He theorized that secondary and tertiary modes of interaction are substituted for primary modes, in large, densely populated, heterogenous cities. However, later researchers have shown little tendency toward the withering away of family life in an urban environment (Berry and Kasarda, 1977:128).

The urban ecology models were later refined by Firey (1947) who in a study of Boston, added a cluster element based on ethnicity; and by Harris and Ullman (1945) who added multiple nuclei to the model. The model became to be regarded as being of limited practical use, however, by the late 1940's. Berry and Horton (1970:307) theorize that this was because the "relationship of the urban environment to the behavior of the urban population remained obscure in this classical stream of research".

Homer Hoyt (1939) put forth an alternative model to explain the changing spatial structure of the city. Based on a statistical study of 142 cities, Hoyt theorized that high and low rent neighborhoods occupied distinct areas of the city, and were not distributed concentrically, but sectorally, in the urban area. The major criticism of Hoyt's model is that it is at best a partial view of the city, constrained by his narrow focus on housing and rent. He gave little consideration to the characteristics of the inhabitants who occupied the structure (Berry and Kasarda, 1977:126).

> "There has been considerable discussion of the relative merits of these classical models of the spatial structure of the city's population. There is an emerging consensus that, in Western metropoli born in the industrial age and populated by a variety of races or national groups, the models are independent, additive contributors to the total socio-economic structuring of city neighborhoods. Those indices which measure the socio-economic status of individuals or groups, vary principally by sector; those which measure the familial characteristics and age of the population vary principally by concentric zone; and those which isolate a minority group within the city population show a tendency for that group to cluster" (Berry and Horton, 1970:309).

This emerging consensus is largely the result of the investigations in recent years into the behavioral basis for the residential location decision.

BEHAVIORAL BASIS: THE RESIDENTIAL LOCATION DECISION

One attraction of the ecological view of the industrial city is that it postulated a process of group competition and mobility that produced the spatial structure of the city's population. In Hoyt's model, on the other hand, the operations of the real estate market are not spelled out, although he recognized the importance of the decisions of prestigious individuals in the location of the high-grade rental sector (Berry and Kasarda, 1977:126).

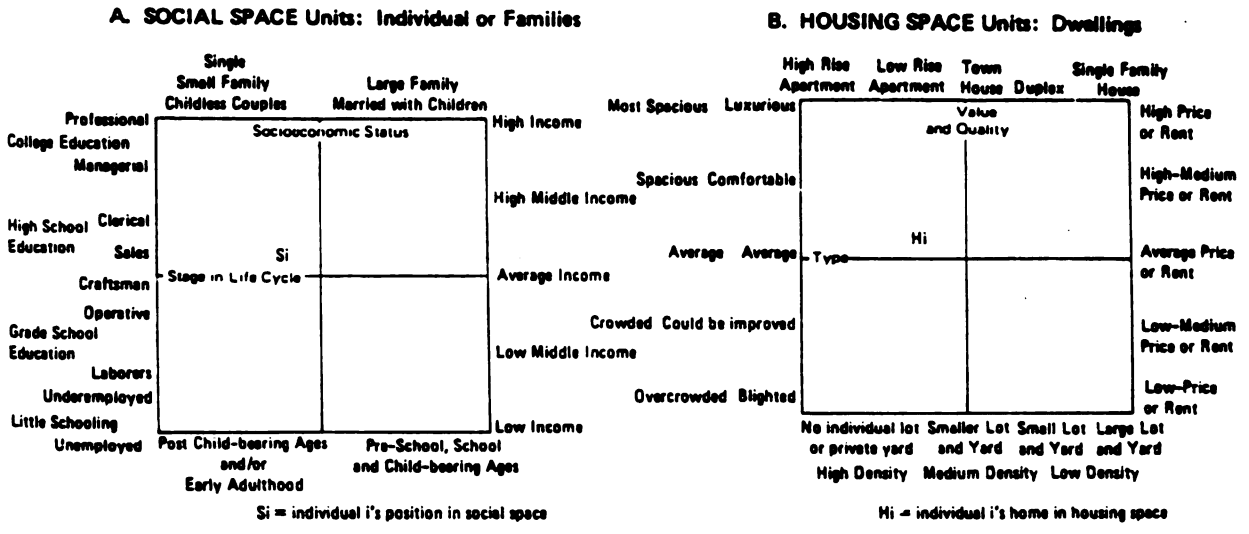
For North American cities an alternative view has been proposed, based on the behavior of individuals and institutions. Residents of a city are faced with a choice of where to live. Theoretically the principal determinants of such a choice are the price of the housing, its type and its location relative to both neighborhood environment and place of work. These determinants have cognates in the attributes of the individuals making the choice. These would be the price willing to be paid for housing which is dependent on income, housing need which is based on marital status and family size, life style preferences and location of the job. When the values of the two sets of characteristics match, a decision to locate will be made (Berry and Kasarda, 1977: 126).

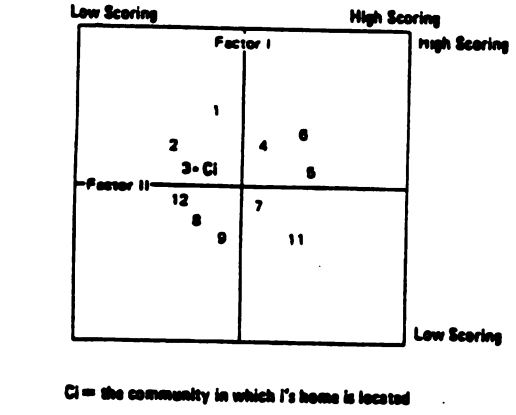
Of all these characteristics, income has been considered the most important. Income determines, to a great extent, the ability to meet the preferences of the individual. The identification, importance and operation of these factors have been shown by a number of researchers. Key among these was Gans (1967) in his participant-observer study of residents of Levittown.

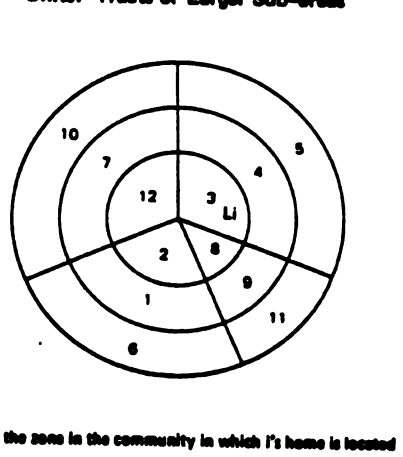
The conclusions of the variety of research that has been conducted is summarized in Figure II. (This is a graphical representation of this

FIGURE II

RESIDENTIAL LOCATION DECISION PROCESS







Source: Berry and Kasarda (1977)

model as it operates at four varying levels of spatial organization. The discussion centers on these models.)

> "The individual and the family occupy a position, s(i), in social space, determined by the economic status and family status. The household matches this position with that of a dwelling located in an analogous position, h(i), in housing space, and of housing in a similar location, c(i), in an equivalent community space, whose axes comprise socioeconomic status on the ordinate and familial characteristics on the abscissa. From a range of possible communities found in the same zone of community space, one dwelling in one community is selected on the basis of proximity to job location or on the basis of other important neighborhood characteristics, thus fixing the choices in physical space.
>
> An orderly social ecology results through like individuals making like choices, through regularities in the operation of the land and housing markets, and through the collaboration of similar individuals in excluding those of dissimilar characteristics from their neighborhood or in restricting certain minority groups to particular areas. The autonomous suburb is the prime example of the process of exclusion, and the ghetto the most glaring illustration of the process of restriction. Sectoral patterning of such attributes of the neighborhood residents as education, occupation, and income, and of neighborhood structural characteristics such as rent or value and quality of housing, is a product of the differing abilities of various income groups to bear the costs of the journey to work. Lower income workers, because of their restricted budgets, must live close to their work. The higher incomes of upper status workers give them the freedom to locate their homes in areas of higher residential amenity, away from their places of work, away from the smoke and dirt of industry, and close to amenity features such as lakeshore and open space. The age structure of the population, average family size, and female labor force participation change as distance from the city center increases; young families locate farther from the center than do older families. This pattern is a response to the change in house age and type as distance from the center becomes greater, the houses newer, and single family homes predominate as the city center is left behind. It is the lower land values toward the urban periphery that make possible this land-voracious construction, and the increasing real income of home buyers makes possible the purchase of such newer houses. Finally, minority groups find themselves segregated from the rest of the population to a greater or lesser degree as a result of recent arrival in the city, discrimination in the housing market, or through choice of home in congenial communities" (Berry and Horton, 1970: 311-313; Berry and Kasarda, 1977:130-131).

ANALYTICAL FRAMEWORK- SOCIAL AREA ANALYSIS

The behavioral basis for analyzing the residential location decision, and the resulting spatial basis for the differentiation of the city's population, as expressed above, provides a theoretical base for examining spatial structure. In the late 1940's and the 1950's, attempts began to be made to provide a holistic framework of analysis, based on theory, that would make clear the linkages between the social, structural, and locational spaces of the city.

The initial attempt to provide a better analytical framework was outlined by Shevky, Williams and Bell in their studies of Los Angeles and San Francisco (1949, 1953, 1955). From a number of postulates, they derived three constructs which, they felt, described the way in which urban populations are differentiated in industrial societies. The three constructs were called social rank (economic status), urbanization (family status), and segregation (ethnic status). Based on these constructs they proposed three indexes, one for each of the constructs, made up of from one to three census variables, and designed to measure the position of census tract populations on scales of economic, family and ethnic status. The analysis also made possible the classification of census tracts into social areas based upon their scores on the indexes (Hartshorn, 1980:232).

This initial attempt at creating an analytical framework was criticized on both theoretical grounds that is the theory underlying the constructs, and for empirical reasons or the method of dimensioning the constructs (Hawley and Duncan, 1957; Duncan, 1955). Bell (1953) attempted to meet the empirical objections that the social area analysts selected measures on the assumption that the constructs were correct,

but failed to provide a test of their validity. He used factor analysis to show that, in the case of Los Angeles and San Francisco, the variables selected from the census to construct the indexes, did indeed conform to Shevky's formulation. Bell's work was extended by Van Arsdol, Camilleri and Schmid (1958) who tested ten cities along these lines. Of the ten, six conformed to the Shevky constructs. Berry and Kasarda (1977:123) feel that the presence of four cities that did not conform suggests that the existence of the constructs should be left as an empirical question to be determined by the patterns in the variables, rather than one to be assumed correct a priori. The logical extension of this argument is that many more variables detailing the way in which census-tract populations vary according to socioeconomic characteristics should be included in any study and that factor analysis should be used to isolate the fundamental patterns of variation in the data. This involves the use of another type of factor analysis, principal component analysis. Kendall emphasized the difference between factor analysis and principal component analysis in a manner that makes clear the difference in the approaches. He states: "In component analysis we begin with the observations and look for the components in the hope that we may be able to reduce the dimensions of variation and also that our components may, in some cases, be given a physical meaning. In factor analysis we work the other way around; that is to say, we begin with a model and require to see whether it agrees with the data and, if so, to estimate its parameters" (Kendall, 1958: 122). The evolution of this type of analysis, formally called factorial ecology, is traced in Figure III. (This figure depicts the two approaches to Social Area Analysis and the

FIGURE III

SOCIAL AREA ANALYSIS

SOCIAL AREA ANALYSIS, broadly defined

Type	SOCIAL AREA ANALYSIS, STRICTLY DEFINED	FACTOR ANALYSIS OF SOCIAL AREA STRICTLY DEFINED	FACTORIAL ECOLOGY
		VARIABLES	
Method Employed	Construction of Shevky-Bell indices	Factor analysis of Shevky-Bell index variables	Factor analysis of a wider set of socio-economic variables, including the Shevky-Bell set

Social area analysis, strictly defined
SHEVKY and WILLIAMS; SHEVKY and BELL

Criticism
HAWLEY and DUNCAN, DUNCAN

Continuing applications of social area analysis, strictly defined e.g., HERBERT;McELRATH	Tests of social area constructs using factor analysis BELL; VAN ARSDOL, CAMILLERI and SCHMID	Cluster analysis of socio-economic data for census tracts TRYON
	Factor analysis of socio-economic data for census tracts deriving basic dimensions which are compared with available theory. Works reviewed: SCHMID and TAGASHIRA SWEETSER GOHEEN MURDIE PEDERSON BERRY ABU-LUGHOD	

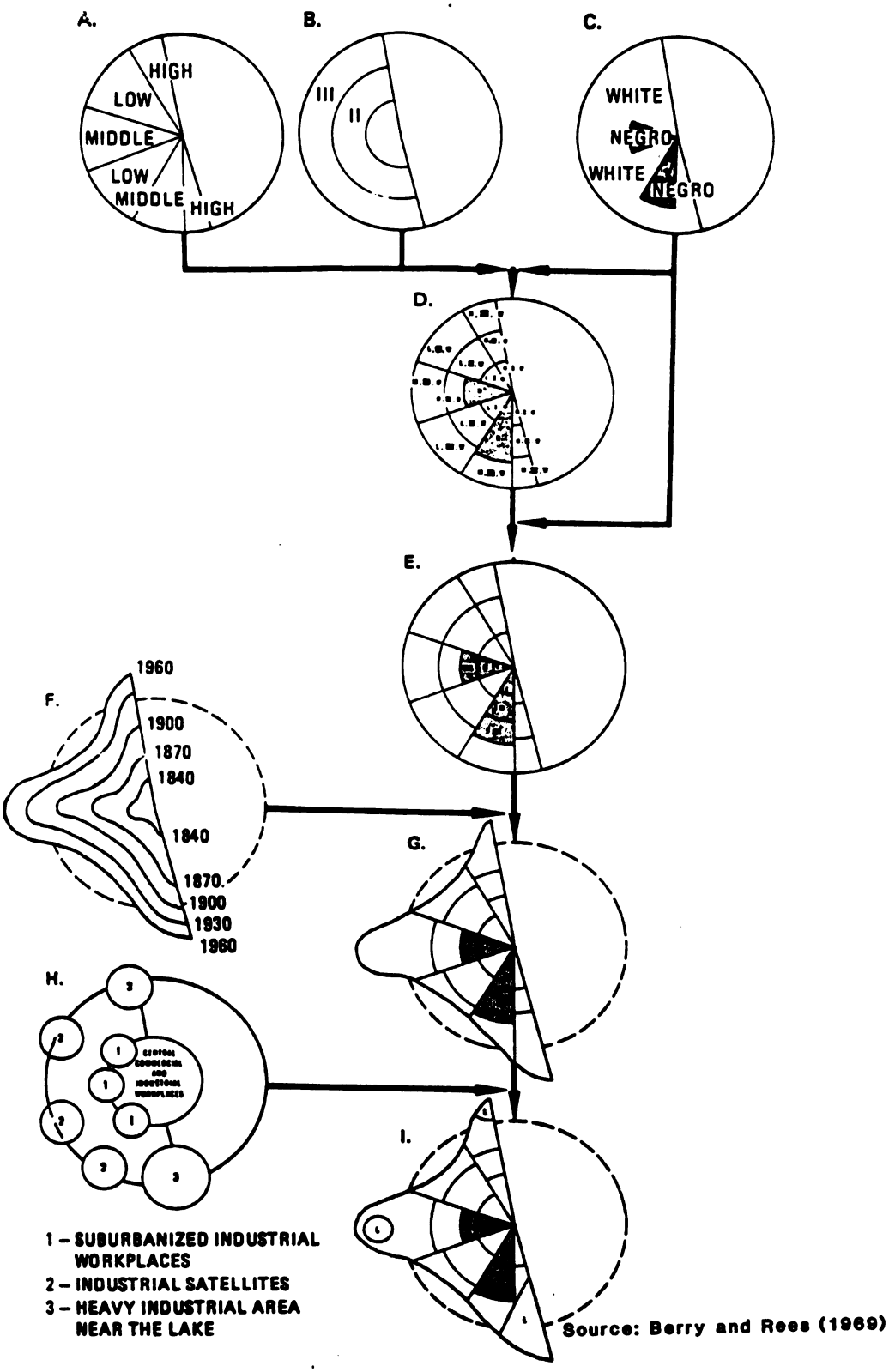
Source: Berry and Horton, 1970

criticisms and refinements of the initial proposal that have been accomplished).

In factorial ecology, a data matrix is analyzed containing measurements on m variables for each of n units of observation (census tracts, wards, etc.), with the intent of (1) identifying and summarizing the common patterns of variability of the m variables in a smaller number of independent dimensions, r, that additively reproduce this common variance; and (2) examining the patterns of scores of each of the n observational units on each of the r dimensions. The dimensions isolated are an objective outcome of the analysis. Interpretation of the dimensions (factors) depends on the nature of the variables used in the analysis and the body of concept or theory that is brought to bear. Theory provides the investigator with a set of expectations regarding the factor structure which can then be compared to the actual set of factors produced. This comparison was made formally by Van Arsdol, Camilleri and Schmid (1958). What is important, however, is that studies of American cities have, by and large, have identified the three social area dimensions originally proposed by Shevky (Berry and Kasarda, 1977:123). (See Figure IV, Illustrations A, B, and C)

Moreover, as mentioned earlier, it has become increasingly evident that each of these dimensions captures the essential features of one of the classical spatial models: socioeconomic status (Hoyt); family status (Burgess); ethnic status and segregation studies (Firey). This observation was clearly made by Anderson and Egeland (1961) in their analysis of the spatial variance of a number of socioeconomic variables for Akron, Dayton, Indianapolis, and Syracuse.

FIGURE IV Integrated Spatial Model of the Metropolis



Source: Berry and Rees (1969)

This basic triad of spatially arranged social dimensions can be superimposed to form, at the intersections of sectors, zones, and segregated areas, communities of similar social, family, and ethnic status. Figure IV provides an idealized picture into which distortions can be successively introduced to approximate reality more closely. However, there is a further complication. The zones within the segregated area occupied by the minority group do not correspond to the general life cycle zones of the metropolis; the segregated area is a microcosm of the whole, compressed spatially, reproducing in miniature, the metropolitan-wide pattern (Figure IV, E). This modified pattern is then further distorted by city growth (Figure IV, F). 'Tear faults' develop as zones cross sectoral boundaries, with displacement of zones outward in the early-growth sectors. Finally, introduction of secondary work-place nodes- a heavy industrial area in the southern part of the city, industrial satellites in a crescent- further changes the form of the model for the metropolitan region (Berry and Rees, 1969:115).

A CROSS-CULTURAL CONTEXT: THEORY AND FRAMEWORK

GENERAL EVIDENCE

It has been shown that from the bases of residential choice, the ecological pattern of American cities is dimensioned cumulatively by socioeconomic status, family status, and the constraints of race and ethnicity. What of non-American cities? Do they exhibit the same patterns of variation in census tract populations?

One of the earliest, and most comprehensive studies of a non-American city, was Pedersen's (1967, in Berry and Horton, 1970:317) study of Copenhagen. Pedersen constructed a matrix of 14 socioeconomic

variables and 76 zones of the city, for both 1950 and 1960. Pedersen identified three factors, (1) urbanization or family status; (2) socioeconomic status; and (3) population growth and mobility. The first factor, when mapped, displayed a Burgess concentric ring pattern. The second factor displayed a sectoral pattern, with the exception of the central zone, which was of uniformly low status. The third factor clustered in the central zone and the urban periphery.

Sweetser (1965) conducted a cross cultural comparison between Helsinki and Boston in which the Shevky-Bell constructs were identified. These early studies highlighted the cultural context of the factor structure. This limiting factor was addressed by Abu-Lughod (1969) and Berry and Rees (1969). These investigators aimed at isolating those basic conditions in the urban system, social and spatial, which are necessary to produce the observed factor structure. Abu-Lughod in her study of Cairo found that "no factorial separation between indicators of social rank and the indicators of family cycle stage could be obtained" (1969: 21). While this was not unexpected given the limited industrialization of Cairo; this result prompted her to outline the conditions that were necessary and sufficient to produce the dimensions of socioeconomic status and family status that are found to have independent existence in the studies of American cities (Berry and Horton, 1970:319). These conditions are set forth in Figure V. Concerning these conditions, Abu-Lughod writes:

> "The disassociation between social rank and familism variables found in contemporary western cities in societies at the terminal stages of the demographic transition can be attributed to the reinforcing and cumulative effects of several conditions that define the nature of urban organization in such cities: (1) residential segregation according to modern ranking systems; (2) relatively low correlations between social rank and differences in fertility and family styles: and (3) high differentiation of

FIGURE V

Summary of Janet Abu-Lughod's "Neccessary Conditions"

Factor Conditions	Types of Variables Used	Necessary Conditions
Socio-economic status factor	Education, Occupation, Income	1. "That the effective ranking system in a city be related to the operational definition of social status"; 2. "That the ranking system in a city be manifested in residential segregation of persons of different rank at a scale capable of being identified by the areal units of observation used in the analysis."
Family status factor	Family size, Portions of the age pyramid, Fertility	1. "That family types vary, either due to 'natural' causes such as those associated with sequential stages in the family cycle, or to 'social' causes such as those associated with other divisions in society, whether ethnic, socio-economic or other"; 2. "That subareas within the city are differentiated in their attractiveness to families of different types" at a scale capable of being identified by the areal units of observation used in the analysis.
Disassociation between between socio-economic status and family status dimensions		Either: 1. That there exists little or no association between social class and family type; or 2. If there is some association between social class and family type, a. there is a clear distinction between stages in the family cycle, each stage being associated with a change of residence; b. "subareas within the city offer, at all economic levels, highly specialized housing accommodations especially suitable to families at particular points in their natural cycle of growth and decline" at a scale capable of being identified by the areal units of observation used in the analysis; and c. "Cultural values permitting and favoring mobility to maximize housing efficiency, unencumbered by the 'unnatural' frictions of sentiment, local attachments or restritive regulations."

Source: in Berry and Kasarda (1977)

> residential sub-areas by housing types. To the extent that these conditions are not perfectly fulfilled, the vectors will not be totally disassociated" (Abu-Lughod, 1969, 30).

In their study of Calcutta, Berry and Rees addressed the issues raised by Abu-Lughod. The conditions outlined by Abu-Lughod were expressed in several alternative factor structures representing permutations of the three basic sets of variables. (SES: socioeconomic status set; LC: stage in life cycle of family status set; MG: minority group set) (Berry and Rees, 1969:468). These permutations are presented in Figure VI. These combinations constituted the frame within which Berry and Rees evaluated the factorial ecology of Calcutta. Within this frame, Berry and Rees were also able to draw upon a qualitative study of Calcutta's spatial structure by Bose (1960). Berry and Rees were also working within the context of Sjoberg's (1960) contrast of preindustrial and industrial urbanization. (Berry and Rees saw a strong similarity between Sjoberg's classification and that of Chatterjee (1960) for Indian cities.) Sjoberg's view was that:

> "The feudal city's land use configuration is in many ways the reverse of that in the highly industrialized communities. The latter's advanced technology fosters, and is in turn furthered by, a high degree of social and spatial mobility that is inimical to any rigid social structure assigning persons, socially and ecologically, to special niches...There are three patterns of land use wherein the pre-industrial city contrasts sharply with the industrial type: 1) the pre-eminence of the central area over the periphery, especially as portrayed in the distribution of social classes, 2) certain finer spatial differences according to ethnic, occupational, and family ties, 3) the low incidence of functional differentiation in other land use patterns" (in Berry and Kasarda, 1977:110).

The inclusion of this additional theoretical base is of particular note. It moves the study out of a pure American context, and places it in the context of a pre-industrial to industrial society continuum.

FIGURE VI

FACTORIAL COMBINATIONS

Combination 1 (Shevky-Bell)

Variable Set	Correspondence	Factor
SES		1
LC		2
MG		3

Combination 2

Variable Set	Correspondence	Factor
SES		1
LC		2
MG		3

Combination 3

Variable Set	Correspondence	Factor
SES		1
LC		2
MG		

Combination 4

Variable Set	Correspondence	Factor
SES	1	
LC		2
MG		

Combination 5

Variable Set	Correspondence	Factor
SES		1
LC		
MG		

Combination 6

Variable Set	Correspondence	Factor
SES		1
LC		2
MG		3

Combination 7

Variable Set	Correspondence 1	Factor
SES	1	Family Status
	2	
LC		
	3	Urbanization
MG	4	

Source: Berry and Rees, 1969

In their conclusions, Berry and Rees state:

> "In terms of the factor models then, Calcutta conforms most closely to Combination 3, in which there is a separate family-status dimension, but socioeconomic status and minority group membership are linked.....This particular factor combination raises serious questions about relative emphasis placed on different dimensions in the choice model. (However) the resulting ethnic base of much decision making can be embodied in the residential choice model...To the two choice dimensions of individual social space discussed in the American context can be added a third dimension of ethnicity. The dimensions can be reordered, with ethnicity placed at the head and altered in length; this makes ethnicity the most important element in the choice process (for Calcutta)." (Berry and Rees, 1969:490).

Beyond this, Berry and Rees did find the same dimensions outlined by Shevky and Bell, and as modified by the conditions set forth by Abu-Lughod. They also concluded that the invasion and succession process, and a continuing transition from a pre-industrial to industrial system was in effect. Concerning this, they concluded "As the transitional process continues, however, one might reasonably expect the socioeconomic and ethnic bases of differentiation to separate. The expectation is, therefore, that differing urban ecologies related to differing factor combinations can be arranged along a scale of urban development from pre- to post-industrial forms" (Berry and Rees, 1969:491).

THE CASE OF TAIWAN

When the literature relating to Chinese urban areas is examined, two points are immediately apparent. First, there is a relative lack of literature. Research on China has tended to center on rural areas and villages, not unexpected given the rural character of the region. Secondly, no literature has been uncovered in this effort that deals directly with the urban ecology . The work on Chinese cities in the pre-1949 period centered on the structural morphology of the city, the

distribution of cities, and the hierarchial arrangement of cities. The literature relevant to this study on Chinese and other Asian cities was reviewed in Chapter Two.

The research that has been done on the traditional city structure in China has primarily focused on the form of the city. Researchers such as Chang Sen-dou (1961, 1963, 1970) and Eberhard (1955) concentrated on the structural morphology of the city and its relationship to cultural and cosmological values. In addition, Chang has devoted sections of his work to the distribution and hierarchial arrangement of cities. Thus, while a clear picture of the form of the city is available, little has been presented on the arrangement of people within the city.

This also holds true for the studies that have centered on the treaty ports. A clear example is that of Murphey's (1953) work on Shanghai. While a clear picture of land use is drawn, delineating residential areas, little mention is made of the social arrangement of those areas.

In the post-1949 period certain distinctions in the nature of research on cities must be made clear. While work on the spatial structure of the PRC cities has been done, this work is of little value in terms of the theoretical approach being outlined here. This theory rests on concepts of social and spatial mobility, and processes of invasion and succession. Given the social constraints on mobility in the PRC, and the significant intervention of the government in restructuring the cities, their utility to this study rests on their function as foils or counterpoints to the process occurring in Taiwan. This is not, however, to say that such an approach can not be utilized in the PRC, given the proper theoretical reformulation. In terms of Taiwan, research

on cities has tended to concentrate on economic base and transformation, migration, and the hierarchial structure. While these have value in explaining the factorial space of Taiwanese cities, they provide little information on the social geography of such cities. However, the migration studies of Liu (1979) and Speare (1974) are of particular use in establishing the presence of a process of invasion in the urban regions. The economic works of such researchers as Galenson (1979) and Ho (1978) are valuable in establishing the increasing transformation in Taiwan to an industrial based society.

In establishing the residential groupings that did exist, reliance must be on passing or oblique references to this issue contained in works dealing with some other aspect of urban life in China. A large number of authors have at least some small measure to contribute. Among the more significant contributors were Deglopper (1977), Gallin and Gallin (1974), Baker (1977), Eberhard (1955,1964), Fei (1953),and Feuchtwang (1974). The factors that have been identified are as follows:

1. Ethnicity Factor - Based on regional and linguistic associations.

2. Family Structure Factor - Based on kinship, age, and stage in the family life cycle. To a lesser degree this grouping could have a lineage, clan or surname dimension.

3. Socioeconomic Factor- Based primarily on occupation and education. Income seems to have been expressed very weakly.

4. Religious Factor- Based on neighborhood temples and differing religions.

5. Military Factor- Based on groupings of military units in the urban environment.

6. Land Use Factor- Based in particular on commercial sectors, agricultural land in the city, and "parkland" such as that associated with Bhuddist temples.

Based on these factors, and what is known about Chinese cities, some general hypotheses concerning the nature of the urban ecology of traditional cities can be made, at least as they were structured before 1911 in general, and before 1895 in Taiwan. In terms of social groups, a broad division existed between the gentry class characterized by administrative occupation and education levels and the rest of the residents. Within the non-gentry sector of the population, several things can be postulated. First, evidence from researchers such as Eberhard indicates that cities were organized into distinctive areal units based on occupation. Secondly, it can be postulated that these occupations were strongly linked to ethnicity, particularly place of origin. Thus, it can be postulated that there was little separation between the ethnic and socioeconomic factors. However, ethnicity was not necessarily tied strongly to the income dimension. In addition, one can theorize that there existed clusters of residents identified by the other factors listed.

THE RESEARCH QUESTION: RESIDENTIAL SPACE IN TAIPEI

In studying Taiwan, the theory and framework, discussed earlier appears to be applicable, with some modification along the lines suggested by Berry and Rees (1969). Taiwan has an economy that can be characterized as industrial in nature and within a market type economy. In addition, residents have both spatial and social mobility, a key element in the behavioral basis theory of residential location. However,

given the potential of the ethnicity factor to play a key role in the decision making process, modifications along the lines suggested by Berry and Rees must be included. In other words, to the choice dimensions of individual social space discussed in the American context, must be added the dimension of ethnicity. While researchers such as Gallin and Gallin (1974) indicate that this dimension played a key role in Taiwan, it is not a proven fact. Remember, in the Taiwanese context 'ethnicity' is narrowly defined as differences in place of origin, dialect and surname. Thus, the reordering of the dimensions, suggested by Berry and Rees, should not be accomplished at the expense of the original ordering. In practical terms, this means that the dimensions should be left as is, with forewarning that a situation not unlike that found in Calcutta may be exhibited; that is a situation that does not fit the standard model, based upon differences unique to the country.

Based on the preceding discussion and the area of investigation, it can be argued that Taipei has, over the last one hundred years, been the scene of confrontation between traditional Chinese institutions and industrial urbanization. If this is in fact the case, then the urban ecology should not only reflect the diversity of Taiwan and its culture, but also the two further ecological themes of the preindustrial city categorized by Sjoberg (pre-eminence of center over periphery, low incidence of functional differentiation in land use), and an increasing admixture of the ecological patterns of the industrial city. (after Berry and Rees, 1969) In addition, as the city moves from a pre-to a post-industrial form over time, it can be argued that a different urban ecology, related to differing factor combinations, will be realized.

The research question will be addressed by assuming the analytic stance of factorial ecology. The study is patterned on that conducted by Berry and Rees (1969) for Calcutta, and can be considered as modeled on that work; although more properly it is an extension of the social area analysis of Taipei conducted by Hsu and Pannell (1978).

In reviewing previous studies of this type, it is evident that the region primarily selected is the politically defined city. Berry and Horton (1970) argue for a wider area, so as not to underbound the labor market. By the same token, they also argue against overbounding the labor market by analyzing too large of an expanse. Cullingford and Openshaw (1984) argue for a regional approach. Working within a development context, and the identification of deprived areas in the rural sector, they proposed an area approach given the area basis of census data in England. Basically they propose analyzing urban and rural data separately. This would allow the interpretation of the factors to be set in either a rural or urban context.

This study proposes to examine the Taipei Metropolitan Region as defined by Liu (1979) and depicted on Figure VII. (located in Appendix A. It is the 1983 land use map of the Taipei Basin mentioned earlier. The area covered corresponds to the large map on the sheet.) Classification of rural and urban areas will not be done. The area is highly urbanized and limiting the study to the Basin region not only encompasses the functional area of the city, but eliminates the need to construct separate factor structures for rural and urban areas. The area, for all intents and purposes,is urban.

In selecting the variables to be used in the social area analysis, the body of theory that is brought to bear directs the dimensions within

which the variables are selected. That is, the theory creates a set of expectations regarding the factor structure, and these expectations provide the dimensions from which specific variables are selected. In this study the characteristics of Taipei initially deemed significant in explaining residential patterns are based on the dimensions drawn from the literature on Taiwan (cited in Chapter Two). They are:

1. Demography
2. Race and Ethnicity
3. Religion
4. Income
5. Occupation
6. Educational Levels
7. Mobility
8. Housing
9. Employment
10. Land use characteristics

The actual variables that are selected must, in sum, depict the various dimensions. In this context it seems necessary to provide further definition to two of the dimensions. Racial and ethnic characteristics must reflect regional origin and language to capture the dimension. Housing characteristics includes data on structures, as well as on household organization.

The actual variables selected to depict the various dimensions was done in the field. The field work was conducted in 1985 and 1986. The variables were drawn from secondary data sources, particularly census data, information which is unavailable in the U.S. at the scale needed. By and large all available data from the target years, at the

appropriate scale was used. The attempt was to insure that the perceived dimensions were represented, but not to influence the outcome by eliminating variables that may have great explanatory power. The process of selecting the actual variables selected is discussed in Chapter Four.

Most factorial ecologies have been confined to one time period. However, researchers such as Goheen (1971) have illustrated the benefits to be gained by comparison over time. From these comparisons, and a factor analysis of the change variables, trends can be identified, as can the significant variables undergoing change. In terms of this study, one time period, 1980, was selected, based upon data availability. By the year 1980 the industrial economy was firmly established and rural to urban migration was low. By this time some 66% of the nation was urban, and much of the transition from a rural to urban nation was accomplished.

The method employed is a factorial ecology. The factor analysis used the Statistical Package for the Social Sciences (SPSS) program with varimax rotation.

The factors were interpreted based upon the theoretical considerations expressed in this paper. Factor score intervals will be mapped and analyzed. The study, while having tremendous value simply as a descriptive tool, does expect to discover change occurring over time. While research of any kind concerning Taipei is limited, historical analysis in conjunction with the theories outlined, establish the opportunity to theorize about the changing nature of residential space in the city.

Two studies done on the city, with applicability, include one article that attempts to systematically assess the area, and one other

that attempts to establish a foundation for describing the motivations and processes involved in residential moves in Taipei.

Hsu and Pannell (1978) used the technique of factorial ecology to investigate a portion of the politically defined city. The study, while providing some valuable descriptions and signposts for future researchers, fell short in its execution. Its weaknesses were basically twofold. First, the range of variables was extremely limited. Secondly, the geographic unit (scale), known as a 'traffic zone' was too large and the total area studied seriously underbounded the functional region. This is not to denigrate the study. Basically, Hsu was working in the field of transportation geography, and the paper was an attempt to stretch the gathered data. While the work had its problems, it is the only attempt found that tries to systematically describe the residential space of the city.

Wang Su Chang in her dissertation (1981) dealt with the process of residential moves. Wang is a phenomenologist by training, and seeks to apply the approach to understanding the push/pull factors involved in intra-urban moves; and particularly why certain chosen locations (the study areas) were selected as destinations. While one can question Wang's approach and methodology, she has provided the only information generally available on movement behavior and perception of the relative status or desirability of various destination sites in the city.

As mentioned, this study builds on the larger body of theory in the field, as well as the above two studies. In particular this work is an extension of the Hsu and Pannell study. In any event, both the previous study and the larger body of theory give evidence that the residential pattern of the city should change over time. That is, in the

traditional city the residential pattern was relatively simple. The major residential group was an educated or 'gentry' class, either Japanese or Chinese, depending on the time frame. The remainder of the city was characterized by a mixture of income and social classes with neighborhoods delineated by ethnicity as expressed in family surname or village of origin. As development came to the city in the post-World War II initial patterns continued. This study, based on the available evidence would hypothesize that over time changes did begin to occur as Taipei began to establish a wider range of neighborhoods characterized by a similarity of socio-economic status, ethnicity or stage in the family life cycle. In Chapter Two the traditional pattern has been shown. In Chapter Four changes in specific neighborhoods will be shown by establishing the current pattern and tracing the historical record for the area.

Abu-Lughod in her work on Cairo cited earlier was basically saying that for these elements to become apparent as significant contributors to neighborhood formation and separation along the Western model, then development must occur. Conversely it can be argued that if development occurs then it should be accompanied by a change within the residential structure of the city, and that such change will be reflected in the factor structure of variables describing the residential population. More specifically, it is argued that over time there should be an increasing separation in the four major factors of socio-economic status, stage in the family life cycle, ethnicity and mobility. In precise terms this study hypothesized that:

1. In 1980, the city had progressed to the industrialized stage (described by Timms,1970) and separation among the factors is found.

2. In 1980, the factor separation that is present will be expressed with its associated pattern.

In plain English, the hypotheses are stating that by 1980, a factorial ecology of the city will indicate that distinct neighborhoods will be able to be detected along the lines of those formed in other industrial cities. Each factor for the residential population that is found to be separate and distinct will present its associated pattern. For example if a socio-economic sorting factor is found to be separate and distinct, it will present a concentric zone pattern.

Again, the true value of the project is that even if the hypotheses must be rejected, the factorial ecologies will still yield sufficient information to identify and map social distributions in the city.

CHAPTER FOUR

THE RESEARCH EXPERIENCE AND RESULTS

Spatial Scale and Required Variables-The Data Base

Scale

With the research problem formulated and the method of analysis selected, it became time to answer the proposed questions for Taipei. The first major step involved was to select the appropriate scale at which data would be gathered and analyzed, and to define the variables needed. In the United States the tendency of studies of this type is to use the data generated by the Census Bureau. This data base provides the types of variables desired by the researchers. This is advantageous as it saves researchers from the expense of time and effort that would be involved in generation of the data. However, this data base would have been unusable if it was not gathered at the scale required by the researcher.

While not privy to the decisions of earlier researchers using factorial ecology and with no significant discussions of the problem of scale in their published works, it seems likely that the goal was to find a spatial unit that was at some level of aggregation (as the studies were concerned with gross patterns and not individual locations), but not a level so large as to subsume significant differences within the general urban pattern. Census data offered a viable data base, as the information that is gathered can be accessed

at a variety of scales. The problem for researchers, once they determine the census offers the range of required variables, is to determine if any of the scales are appropriate to the type of study being undertaken. The scale chosen by most researchers as appropriate is the tract. This subsumes the individual choices, as well as the smaller block unit, but it is not so large as to overshadow smaller areas of potential significance. Understand that this may not be the ideal, desired choice. Logically, the level of individual household is probably the most desirable. By treating each household as a separate unit the researcher can be sure of identifying areas of significant difference. With any level of aggregation, and the accompanying averaging of statistics, one introduces some potential error. However, the level of individual household simply results in too many spatial units. For example, if the household level was used in this study, and combined with 50 descriptive variables, this would result in an algebraic matrix that was four million by 50 and contained some 200 million individual cells to be analyzed. It is clear that some compromise concerning scale must be made. Earlier researchers selected the tract level, understanding that it represents a compromise.

For this study it was decided that a similar size spatial unit was appropriate. The ideal unit would encompass somewhere between five to ten square blocks or approximately 1000 family units. This would keep the number of spatial units to a manageable size, while still permitting the identification of smaller areas of significant difference. Ideally, the goal was to find an existing data base which met the same demands facing earlier researchers in the U.S., that is, a data base that had an acceptable variable range at the desired scale. If such a data base did

not exist it would create serious problems in terms of both time and money.

Variables

An underlying assumption of the method of analysis employed in this study is that the patterns of residential arrangement within urban areas of a free market economy are universal. That is, the theories that have been developed, and that are being applied in this study to Taipei, are universal (provided free market forces are in effect) and by and large transcend a specific cultural context. Thus the intent of this study is not only descriptive, but aimed at linking the behavioral basis of the approach and the associated urban patterns, to the Chinese context. Studies in the western world have been relatively consistent in selecting variables that, by and large, describe the constructs (social status, family status, and ethnicity) and thus are likely to produce factors which can be described in those terms. This of course was one of the original criticisms of Williams, Shevky and Bell's initial work establishing the ecological theory and approach. Later studies, using a wider range of variables, upheld the validity of these constructs, thus making it acceptable to limit variable input. This, combined with the use of principal component analysis (which some describe as rummaging around in the data in order to find out if it is related in any way), continue to be consistent criticisms. Both have a certain amount of validity, but the first, that is the limiting of variable input, is probably the more serious of the two. It does seem that to make an assumption that residential space will be described by the three constructs, and thus to limit variable input to those relating to these constructs, is a weak point of the traditional approach. This is even

more critical in a non-Western cultural context where other, unknown, factors may be significant in residential sorting.

While numerous studies have supported the efficacy of the constructs in explaining much of the residential space of the city (as perceived by the researcher), the utility of the constructs is by no means agreed to universally. The framework which supports social area analysis is a theory. By definition it is something that should be viewed with some degree of skepticism. Given the range of criticisms and the fact that the urban experience in China is different from that of the West in a number of potentially significant ways, the universality of the constructs and approach becomes slightly shaky. It becomes incumbent, then, to insure expansion of the variables selected to include a wider range than is often employed in the U.S..

This is not necessarily inconsistent with the framework of analysis provided by factorial ecology. Not only did researchers subsequent to Williams, Shevky and Bell initially employ an expanded variable selection, but Bell himself, in his initial response to early critics (1955) used a wider range of variables. Berry and Kasarda (1973) in their study of Calcutta used all available variables at the scale selected. (See Appendix A) They recognized the difficulty of working in a Lesser Developed Country and the problems involved in obtaining reliable statistical data. Thus, when they found a data base that fit the scale required, and that had many of the standard variables, they used the data base. However, aware of the possibility that the Indian city may be arranged in a different manner than a Western city, they expanded the variable base to include all (potentially relevant) variables at the desired scale. They recognized, as others have, that

the constructs have proven to be of explanatory value and thus variables that relate to them should be included; but that to be sound in approach, one must (if possible) include a range of variables that may describe the residential space of the city in question.

To this end the variables that were considered to be of potential value to this study fell into a number of distinct categories. In Chapter Three were detailed a number of potential residential groupings as identified from the qualitative research of others. These groupings included the three constructs that were detailed by Shevky, Williams and Bell, as well as the potential for a religious, military, governmental housing, and a land use factor (particularly given the lack of land use differentiation in some districts of the city). At the least then, the study sought to include variables that described these potential dimensions. Ideally the study should include a range of variables that describe not only these dimensions, but any potential dimension that the researcher can justify as potentially existing. From a more practical viewpoint there is a limit to the number of variables that can be economically manipulated. In addition, inherent weakness of principal component analysis demands that the constructs (and thus the variables) be justified to some degree before 'rummaging' around in the data. That is, the model construction must be sound. Thus the researcher must select, prior to variable selection, the dimensions it is felt will best explain the majority of the residential pattern, and select the variables based on these expectations. For this study, given the expectations concerning the residential pattern of Taipei, the desired variables fell into a number of distinct categories. These categories satisfied the demands of strict construction of expected spatial

arrangement and still maintained some degree of flexibility. The categories chosen were drawn from the literature on Taiwan. (See Chapter Two for a discussion of these categories.) They include data on the demography, race/ethnicity, religion, income, occupation, education, mobility, housing and employment of the city's residents.

These categories formed the desired data base. It was not meant to necessarily exclude additional variables, rather it was meant to provide a guideline for an acceptable data base that was linked to both the larger body of theory and to the expectations concerning the residential patterning in Taipei. With these expectations in mind, the search began for an existing data base that would meet the requirements of the study both in terms of diversity of variables and availability of the data at an appropriate spatial scale.

The Search for a Data Base

Previous research of this type centering on Taipei was limited to one study. Hsu and Pannel (1978) used the technique of factorial ecology to investigate a portion of the politically defined city. As the only study of this type on Taipei it provided the logical starting point for this research. The study itself did exhibit several weaknesses. First, the range of variables was extremely limited. Secondly, the spatial unit employed, something called a 'traffic zone' was too large. That is, the spatial unit covered so much territory that potential significant differences were likely subsumed. Lastly, the total area investigated, limited to a portion of the political city, seriously underbounded the functional metropolitan region. Not to be unduly critical, the study was a subsidiary study to the project's main focus on transportation in Taipei. None the less, the study is the only attempt extant to try to

systematically describe the residential space of Taipei. As such it provided valuable signposts for further research efforts. Appendix B lists the variables employed in the study. The use of these variables indicated that at least a portion of the desired variables were available.

Using the Hsu and Pannel study as a starting point it was possible to identify one potential source of data. The Taiwan government requires each household/individual to register on a yearly basis with the government. During this registration procedure information is gathered on demographics and education. Unfortunately the information does not include information on economic status, mobility, housing stock, or any of the other desired categories. The lack of range in the variable base made this source less than desirable, but did at least provide a minimally viable alternative if nothing else could be found.

Attention was next turned to the Census of Population that Taiwan conducted in 1960, 1966, 1970 and 1980. As can be seen in Appendix C the range of information covered by the Census is much broader than that covered by the Household Registration Survey. While most major categories that were deemed desirable were covered to one degree or another, it did exhibit one serious lack of data that was of concern. The census data base offers no information concerning economic status, that is, there is no breakdown of the population by income categories as in the U.S. census. This was of vital concern, as class structure and its spatial expression in neighborhoods is vital in understanding the spatial arrangement of cities evolving within a market economy. Given the fact that social status/class are largely associated with economic status the lack of economic data was serious.

Investigation indicated that there existed at least two major reasons for the lack of income related data. First, Chinese social structure is based on extended family units. It is often difficult to set a standard for what constitutes the 'household income', given the pattern of income contributions and disbursements within a varied and complex household system (See Gates, 1982 for one discussion of this problem). Secondly, knowledgeable sources within the country indicate that the residents consistently misrepresent their income when asked (a phenomenon that is hardly unique to Taiwan), thus making such information unreliable and the gathering of it an exercise in futility. Further, inquiries of this nature are highly resented both for cultural reasons and because if nothing else, high incomes attract not only the attention of the tax bureau, but also of thieves. Misrepresentation is possible given the cash nature of the economy. Personal credit, and to a large extent business credit, is not present, at least as we are familiar with it in the United States. Consumer and business credit can come from the 'black market' (sometimes referred to as 'curbside credit' operations in Asia) or more commonly from friends, relatives and employees. Further, checks are usually distrusted, most likely stemming from the widespread practice of issuing post-dated checks, with the inherent gamble on the recipients part that said check may or may not be good when the valid date arrives. As a consequence the economy runs on huge amounts of cash, which makes accurate tracking of the economy difficult. It also makes it nearly impossible for the government to confirm reported figures. Although a personal income tax system is in place, and the government most likely can validate the primary source/amount of income, the issue is further complicated by the large

percentage of the population that has secondary sources of income, usually cash and apparently often unreported. In any event the Tax Bureau is not about to release specific information about households, and it does not aggregate its data for publication purposes. Even if they did publish such aggregate data local economists feel that it could not be used with a large enough degree of confidence as to accuracy.

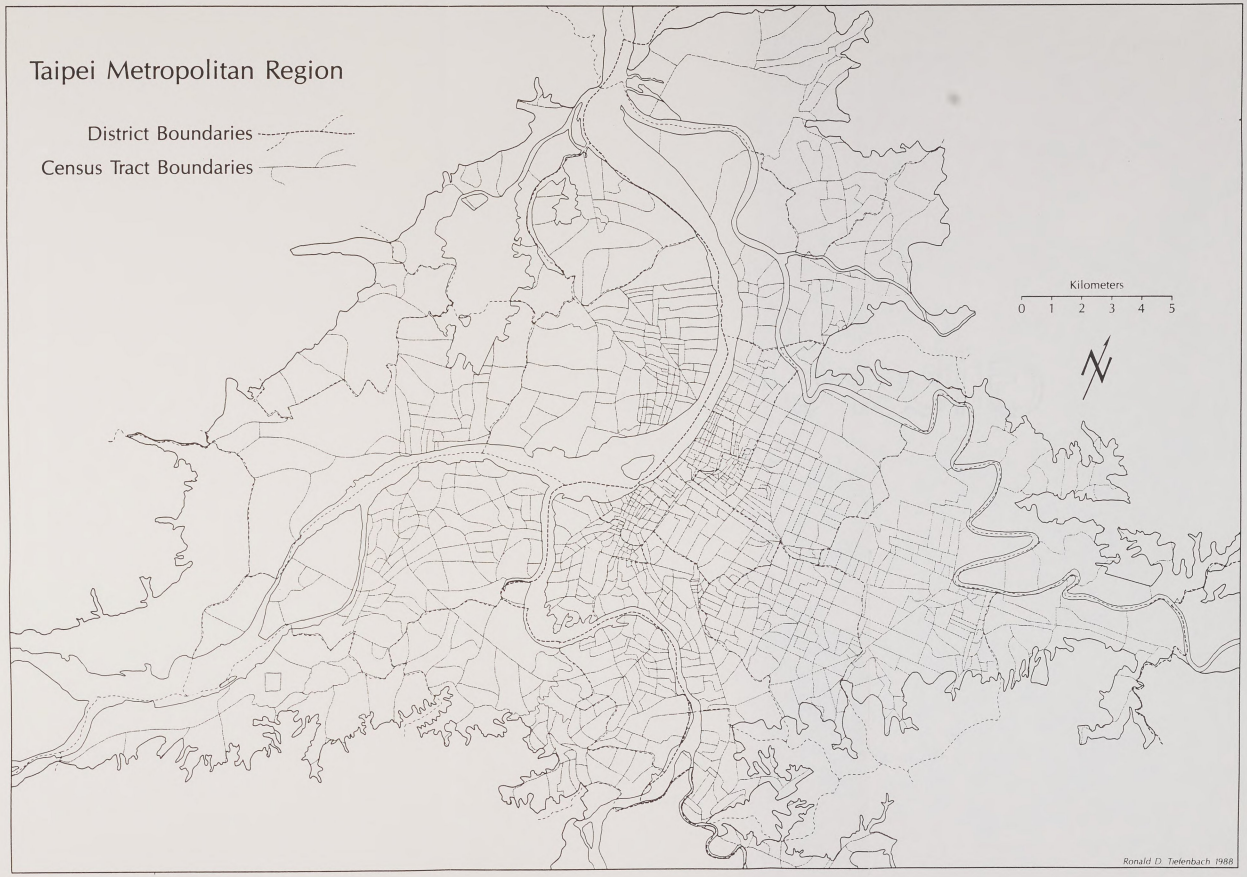
It was learned that the Institute of Economics at the Academia Sinica in Taiwan has, in recent years, conducted a confidential sample survey that is thought to be relatively accurate in assessing household income. (The survey results are not released and the information was provided on a personal basis and then only in the form of conclusions.) While the sample size is statistically significant for the country as a whole, it does not provide complete or adequate coverage of smaller scale spatial units. However, Academia Sinica does feel that a number of valid observations can be drawn from the survey. The conclusion germane to this study is that, at the present time, income and social status exhibit a positive correlation with education. That is, the higher the educational level the higher the status and income. Conversely, the lower the educational level the lower the social status and income is likely to be. This is not an absolute correlation. For example, some of the richer residents became rich as a result of geographical accident; they happened to be lucky enough to own farmland in a high urban growth area. However, the correlation between education and income/status is the best indicator available. It was vital to this study, because it allowed either of the two data bases to be employed.

The next step then was to examine the spatial units by which the gathered data was aggregated to see if any of the levels were

appropriate to the study. It was clear from examination of the published (book form) data that the readily available levels of aggregation were unsuitable. Unlike the U.S. the lowest level of aggregation available for urban areas was at a level known as the 'district'. The districts varied in size (see Figure VIII) but were uniformly too large in population, usually ranging in the hundreds of thousands. A district in Taipei would be the rough equivalent of perhaps a 'ward' in a U.S. city, or perhaps akin to our more generic descriptive terms such as downtown, east side, south side etc. In any event they were too large for the purpose of the study.

Through contact with various governmental and educational agencies it was determined that urban regions were politically organized in a typical pyramidal fashion. The functional metropolitan region of Taipei is organized under two major governmental units. (See Appendix A) The territory lying to the east of the Tamshui River comprises the Taipei Municipality. This city enjoys equal status with county level governmental units. The city is broken down into a number of distinct districts, such as Shihlin. Each district is broken down into a number of tsun or li, depending on whether the unit in question is rural or urban, respectively, in character. The tsun/li are at the same level of organization and the major difference is based on land use character. The tsun/li are a geographic unit that is roughly equivalent to either a precinct or census tract in the U.S.. Ideally, the tsun/li are roughly equal in the number of households, although not in population, housing units or area. Districts vary greatly in size (both population and

FIGURE VIII


Taipei Metropolitan Region
District Boundaries
Census Tract Boundaries
Kilometers
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Ronald D. Tiefenbach 1988

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area) and in the number of tsun/li (from 12-15 to as many as 110). The li sized units are further subdivided into blocks.

The area west of the Tamshui River is largely made up of Taipei County. Within the county, the situation is more complex. Several heavily urbanized areas, such as Sanchung, have city-level status. The breakdown within the cities follows the same pattern as in the city of Taipei. Other areas of the county, which are more suburban or rural in nature omit the equivalent of the urban level of government and move directly to the tsun/li level.

The census takers in Taiwan utilize this political organization in gathering their data. However two significant points must be made. First there is no equivalent level of aggregation or presentation of results that equates to the SMSA in the U.S.. Thus there is no easily available data base. Secondly, and most importantly, the data is published with the district being the lowest level of aggregation.

Inquiries to the appropriate government agencies presented a new series of problems. From what could be learned, very few, if any, researchers, government agencies, or other users of census data had ever requested data at less than the district unit. It was not a level that was generally available. However, the tsun and li which met the desired scale for this study, was the level of aggregation used by the government in creating working files for computer use. By chance it appeared that the data required might be available. Hopes had to be placed on the availability of the computer records in as much as it was learned that the paper records of individual responses, block and tsun/li level aggregations had been seriously damaged in a flood, and thus were not available in any central location. The possibility existed

that district offices had maintained records, but there was no guarantee, and it was advised that obtaining such records from the various offices, particularly by a Westerner, was virtually impossible. Additional research at the district level also indicated that retention of tsun/li level data for the district was more a matter of chance and available storage space than policy.

By this point it was clear that the only potentially useable data base that covered the area required, and the range of variables needed, was the census. In addition, it was the only data base that was consistently aggregated at the tsun/li level which had been identified as the desired spatial unit. Use of the data base depended then, on the availability of the computer tapes.

Through a series of fortuitous circumstances arrangements were made to obtain the desired data for 1970 and 1980. Earlier data was not computerized and not saved in any but the published form. Another glitch soon arose. Computerization of census data began in 1970. A master tape was made from the original data which had been aggregated at the tsun/li level. Unfortunately, the original tape failed, with some 60-70 percent of the tape becoming unreadable, and a backup tape was not found. The tape was never reconstructed, most likely, it was explained, due to the lack of demand for information at that level of aggregation, as well as the unavailability of the original source material. In any case this meant that the project was only able to obtain records for the 1980 census year. While this met the needs of the project, it would have been desirable to have the data from both years. This would have allowed a systematic investigation of change over time. The project then, continued its original proposal of examining the pattern of residential

location in 1980 and comparing it to historical data in order to theorize about any change that might have occurred. While two data bases from widely separate periods may be more desirable, the lack of any base description of the social geography of the city in itself makes the production of such a geography extremely valuable. This, combined with the historical data does provide a picture of any change that is occurring. In addition, the construction of a valid social geography for 1980, paves the way for a more systematic investigation of change when the 1990 census data becomes available. Thus the project is also part of an ongoing investigation into the social geography of Taipei; and the changes that are occurring over time.

Assembling the Data Base

Having determined the appropriate scale, variables and available information, it was time to assemble the needed data base. The computer files for the defined study area were obtained. Investigation showed that there were 1,458 spatial units (tsun/li) within the defined study area. The complete variable base for these units were separated from the main file and a sub-file created. For each spatial unit the census listed 380 variables. (A complete list of these variables is included in Appendix D.) These variables were examined to determine which should be included in the study. The conventional wisdom in selecting variables suggests a limited number of variables that represent the expected dimensions. This study, as explained earlier, sought to include any potentially significant variable at the spatial unit selected. The variable base available was, by and large, used in its entirety. The major change was to shrink the data base to a more manageable size by expanding (combining variables) data categories. For example, the census

listed full employment data in two separate categories, each broken down by type of employment and sex. The division within the census was for the benefit of other users of the gathered data and reflected technical differences in the employment picture that were not germane to this study. Therefore the categories were combined to reflect total employment in a particular economic sector.

In addition, figures were converted in one of two ways. Where appropriate raw numbers were converted to percentage figures. This did not in any way affect the relative position of any spatial unit to any other. Secondly, some new variables were created, the most significant being a number of Locational Quotients (LQ). (The concept of an LQ was developed and used by Berry and Rees in their 1973 study of Chicago) An LQ is a statistical measure that expresses the percentage of a particular sub-group of the population as a function of the total area wide population of the sub-group, and as of a function of the relationship of the spatial unit's population to the total population of the study area. An LQ is expressed as follows:

$$LQ = \frac{\frac{g_{ij}}{\sum_{j=1}^{m} g_{ij}}}{\frac{P_j}{\sum_{j=1}^{m} P_j}}$$

Where: LQ -the location quotient for population group i in area j.

g_{ij}-the total population of group i in area j

$\sum_{j=1}^{m} g_{ij}$ - the total population of group i in the region

Pj- the total population in area j

$\sum_{j=1}^{m} P_j$ - the total area population

In short, a location quotient provides a measure of the concentration of a particular sub-group in the spatial unit.

These changes resulted in the selection of 137 variables to describe the residential population of the study area. The variables selected are listed in Appendix E. The data base consisted of a data matrix having 1,458 spatial units x 137 variables. The variables selected fell into a number of distinct categories. These categories are:

Total Families

Population (by age and sex)

Type of Household

Marital Status

Labor Force/Occupation

Place of Origin

Mobility

Births/Fertility

Literacy

Housing Type/Year Built/Vacancy Rate

Housing Ownership

Housing Size

Housing Facilities (Baths, Kitchens, etc.)

Results-The Factors Extracted

The data matrix having been created was then submitted to principal component analysis using the SAS statistical package available at the Taiwan Ministry of Education's Computer Center. The center employs a number of mainframe computers, and this study utilized one of their IBM 4341 mainframes. In order to facilitate interpretation of the

meanings of the common factors extracted, the factor structure was simplified by use of varimax rotation. In addition, in order to examine the characteristics of each spatial unit, the factor scores of common factors (eigenvalues > 1) in each unit were calculated.

From the matrix, nine factors were selected that explain 80.6% of the total common or shared variance within the data base. Selection was based on the amount of total variance explained by the factor as well as the break point in the scree plot of the factors. Factor number ten and beyond explain less than 4% of the shared variance; and fell beyond the natural break point on the scree plot. The nature of the factors was interpreted using the factor loadings with variables being included that loaded at .5 or above.

Factor One: Socio-economic Status-Upwardly Mobile Blue Collar Workers/Illiterate and Poor Agricultural Labor

Factor One explained 18.6% of the common variance. Figure IX lists those variables with loadings over 0.5. These variables combine to make up the dimension or factor. In addition the factor scores for Factor One are mapped in Figure X. The map shows how the factor is distributed throughout the region. For example, on the map, locations having a Factor Score higher than 2.0 on the positive scale would indicate a place that exhibits a strong concentration of people described by the positive Factor structure (Categories are based on Berry and Rees, 1973). On the other hand, a location with a high negative score, greater than -2.0, would indicate a location that exhibits a strong concentration of people associated with the negative side of the Factor Structure.

FIGURE IX

Factor 1 - Total Variance Explained - 18.6%

High Scores - Positive

Mobility/Origin

Concentration of people born in:	Changhua	Miaoli
	Chiayi	Taoyuan
	Nantou	Ilan
	Taichung	Taichung City
	Tainan	Hsin Chu
	Yunlin	Kaoshiung
		Pingtung

% of total population with an intra-urban move within last 5 years.

Housing

- % Total housing having modern toilet
- % Total housing having piped water
- % Total housing having 4 stories or less
- % Total housing having rental - private sector

Employment

- % Labor force - blue collar
- % Labor force sales/service/guard - labor
- % Total population employed
- % Total population employers

Education

% Total population with vocational education

% Total population with senior vocational education

High Scores-Negative

Housing

% Total housing with traditional toilet

% Total housing with no piped water

% Total housing with traditional farm style

% Total housing with other than established categories

% Total housing with villa

% Total housing with built before 1945

% Total housing with no toilet, bath

Mobility/Origin

% Total population born in Taipei City

% Total population born in County

Employment

% Total population - agricultural labor

% Total population - agricultural foreman

% Labor force in mining

Education

% Total population - illiterate

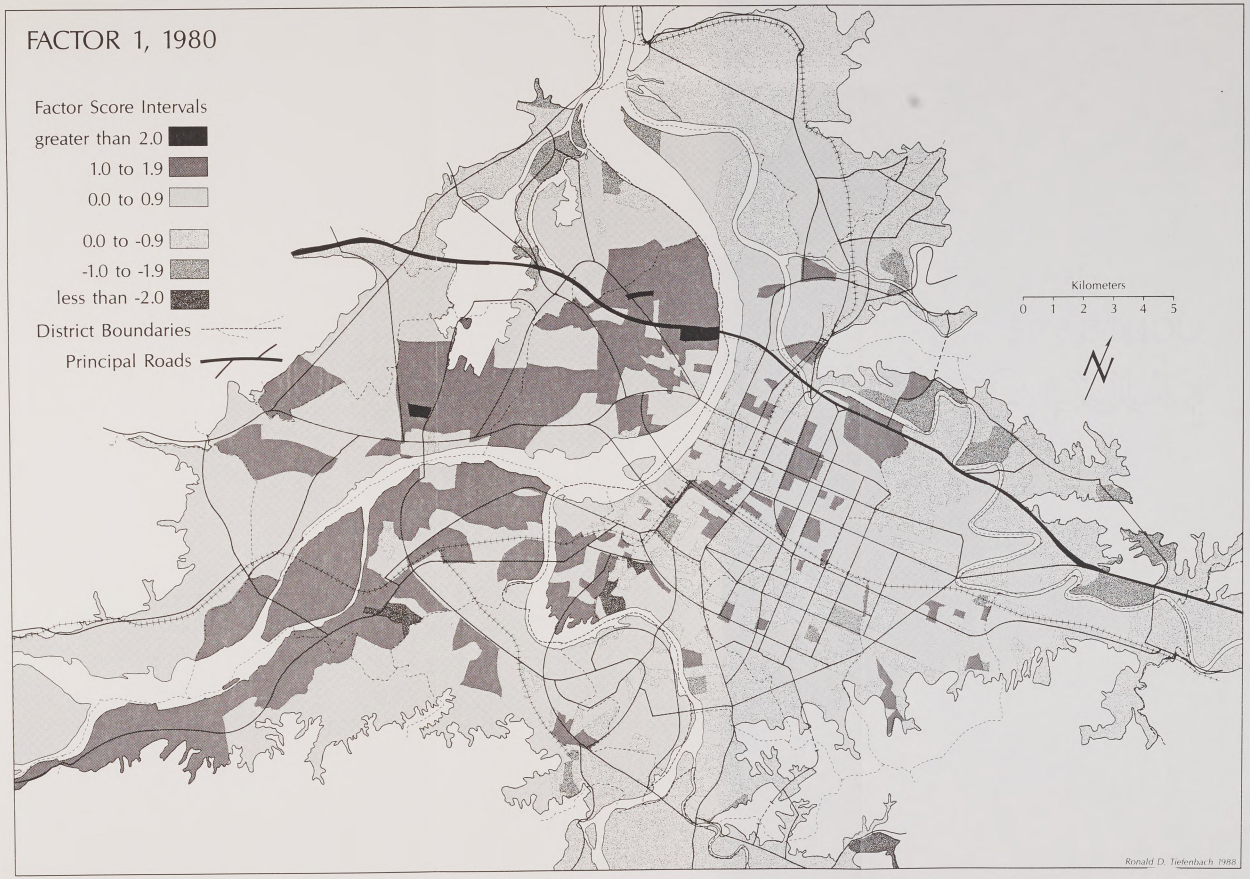
Concentration in population - illiterate

Marital Status/Demographic

% Total population - widowed

% Total population male-female 65 + years

FIGURE X


FACTOR 1, 1980
Factor Score Intervals
greater than 2.0
1.0 to 1.9
0.0 to 0.9
0.0 to -0.9
-1.0 to -1.9
less than -2.0
District Boundaries
Principal Roads
Kilometers
0 1 2 3 4 5
N
Ronald D. Tiefenbach 1988

The positive scores describe an immigrant population of blue collar workers. These blue collar workers are employed in a a variety of largely service type industries. These individuals are relatively recent migrants to the city, having arrived within the 1975 to 1980 period. Upon reaching the city they moved into the type of four story apartment building that was the predominant type of housing being constructed in the 1960's and 1970's. The ownership pattern shows a strong tendency toward rental rather than ownership. This indicates either a strong investment market in real estate, or (as scholarly observation would lead one to theorize) the housing represents the continued investment, through ownership of, what was previously, primary housing units by an upwardly mobile population. The concentration of vocational school graduates combined with the employment pattern in service, guards and laborers indicates a blue collar segment of the population that could probably be described as either lower middle class,or upper lower class. The strong element of the population that is described as employers could be misleading. This sector does not describe employers as we perceive them, but rather small scale entreprenuers providing such services as night market stalls, street vendors or small scale sub-contractors to larger industrial concerns.

What is significant about the segment of the population being described is that it correlates with the observations of Gallin and Gallin (1974) in their follow-up study of residents of Hsin Hsing who had migrated to Taipei. In that study Gallin and Gallin theorized that village associations served as a strong control mechanism in migration to the city. They felt, based on gathered evidence, that new in-migrants settled in the immediate vicinity of those from the area of their

origin, who had moved to the city at an earlier time. In addition, they utilized these connections to obtain employment, if not in the same shop, in the same sector of the economy and in the same general geographic area. For example, the migrants under study lived in a very small geographic area and were largely employed in the Central Farmer's Market. In this instance the same type of mechanism is at work, with in-migrants from a number of areas congregating in the manner described and being employed in the same general sector of the economy.

The population described by the positive side of Factor One have tended to concentrate west of the Tamshui River in the cities and suburbs that make up the bulk of the industrial region of the Taipei Metropolitan Region. In addition they exhibit a large presence in the industrial suburbs to the southwest of the central city area of Taipei. The mapped pattern conforms to the perceived pattern of residential location by the author and a large number of city residents interviewed. It can also be confirmed by examining the population chart on the map in Appendix A. This chart shows the growth of the region over time, and confirms the relatively recent and rapid growth of the area.

The negative loadings in the factor structure describe a segment of the population that are native to the region, and still engage in traditional agricultural pursuits. The population described lack mobility, largely having Taipei or Taipei County as their place of origin. The type of housing is older, often pre-World War II, and either lacking sanitary facilities, or having traditional style facilities. Many of the units lack piped water. The residents are engaged in agriculture or mining, but are not usually owners of the means of production, rather they are laborers. The population exhibits a high

degree of illiteracy. In addition, the population tends to be an aging population; a population that is 65 years old or older and one in which the spouse is likely to have died.

From Figure X we can see that the population described by this dimension tends to inhabit either the fringe areas of the region, such as in the southeast near Hsintien; or the more marginal lands (often in flood plains) such as the peninsula where the Keelung and Tamshui rivers come together. A third example would be the narrow valleys and slopeland near both Sanhsia in the south and the area between Neihu and Shihlin in the northeast. A final example would be in the far eastern section of the metropolitan region near Nankang.

The population described by this dimension most likely represents those residents of long standing who have not adapted to the changing urban environment. Market forces have not been sufficient to drive them from their traditional life style, but changing circumstances has resulted in the children of these families migrating to other places in the urban region and following a more urban style of life. The population segment described is likely to disappear as the city further expands, or the older individuals die. Again, as in the positive side, the statistical pattern matches perceptions.

Factor Two: Socio-economic Status- Upwardly Mobile, Educated Professionals/Indigenous Urban Poor

Factor Two explains 17.7% of the shared or common variance. The variables which make up the Factor, both the negative and positive aspects, are presented in Figure XI. The factor scores for each observation site are presented in Figure XII. In general the factor describes two additional segments of the population. The positive scores

FIGURE XI

Factor II - Variance Explained - 17.7%

High Response - Positive

Mobility/Origin

Concentration of Population born in Lianchang

Housing

% Total housing 30-39 ping

Economic Activity

% Labor force in High Tech./Private Administration

% Labor force in Government Construction

% Labor force in Sales/Service/Guard-labor

% Labor force in White Collar

Education

% Total population M-F 2-3 year college or more

% Total population M-F high school graduates

Demographic

% Total Population - Density

High Response - Negative

Mobility/Origin

% Total population born Taipei City

% Total population born Taipei County

Economic Activity

% Labor force production labor

% Male-Female self employed - no help

% Labor force private sector construction

Education

% Total population - primary school education

% Total population - junior high school education

% Total population - illiterate

Demographic

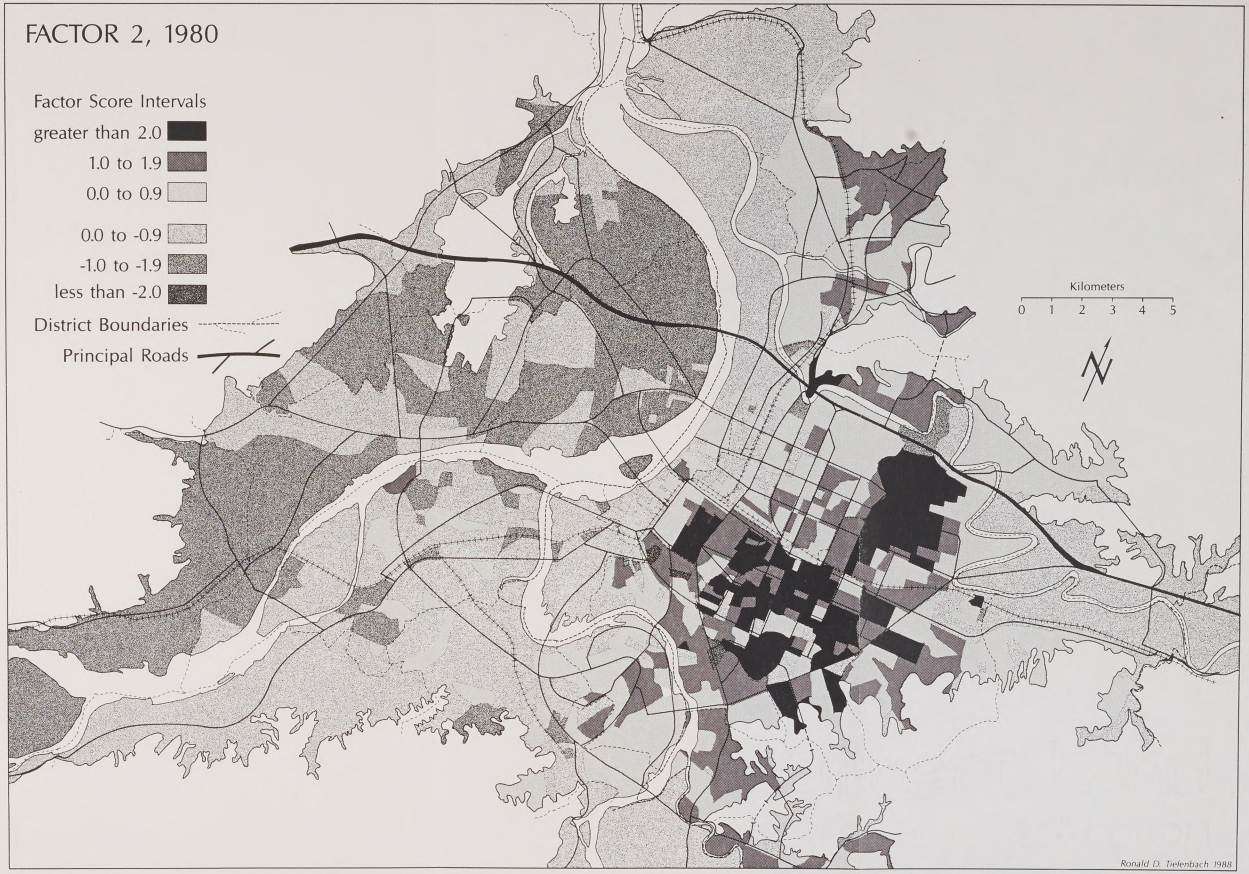
% Total population 0-14 years old

Concentration of live births/surviving infants in last 12 months

Housing

% Total housing - Residence-Manufacturing combined

FIGURE XII


FACTOR 2, 1980
Factor Score Intervals
greater than 2.0
1.0 to 1.9
0.0 to 0.9
0.0 to -0.9
-1.0 to -1.9
less than -2.0
District Boundaries
Principal Roads
Kilometers
0 1 2 3 4 5
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Ronald D. Tielenbach 1988

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delineate a middle/upper class segment of the total population, while the negative scores describe a lower class segment.

The positive, high response variables, in Factor Two describe a population that is highly educated. The major share of the population has a minimum of a high school education and a significant share has at least some college. This is a significant point in a society that values education, and in which education is highly competitive. Scarce resources combined with social and governmental policy restrict education to a progressively smaller percentage of children at each step in the educational ladder. The ...population described here represents the intellectual and social elite of society. This is further reflected in the employment pattern. The population is overwhelmingly engaged in the white collar sector of the economy in such things as high tech, administration and government construction agencies. Those in the sales/service/guard sector of the economy represent higher level administrative jobs in that category of employment.

The factor also describes a housing pattern in which house size averages 30-39 ping (a ping is a unit of measurement equal to approximately six square feet). This would indicate that the residents, or more properly the area in which they reside, has a significant percentage of the more spacious housing available in the city. The fact that the regions associated with the factor are also characterized by high population densities is not necessarily counter to the trend being described. The map of the factor scores for Factor Two indicates that the group being described is largely clustered in a roughly L shaped area that corresponds to the perceived (by the author and interviewed residents) upscale region of the central city. This area contains such

major academic institutions as National Taiwan University and Taiwan Normal University; as well as the area locally named "Ding Hao" which roughly translates as "the best" or "number one" and which runs the length of Tun Hua Street (north-south). This is an area that is serving as a growth pole in the city, particularly around such nodes as the Hsin-yi project and the World Trade Center, and its development in the late 1970's and into the 1980's reflects the growing wealth of the country. The area is sprinkled with high-rise office and apartment buildings; and even the slightly older and lower profile buildings are usually more than the four stories common in earlier times. The combined perception of the region as a highly desirable location (confirmed by Wang, 1984) and the high rise architectural style has led to much higher population densities than can be achieved in less desirable areas usually having lower-rise architecture.

The final element in the positive loadings, not yet explored, would be the concentration of people born in Lianchang. This could have two explanations, both of which require further research. First, residents who have moved from Lianchang to Taipei could be either brighter than the average, or they could have developed a better support system for helping residents from the home area adapt to, and succeed in, the big city. Secondly, and perhaps more likely, the number of individuals who have moved to Taipei could be relatively small and have moved to attend college or high school and then remained. The relatively small number of residents in Taipei from Lianchang could be concentrated in one area creating a statistical anomaly.

Much of the distribution of this population segment has already been described. However, there remains two significant concentrations.

Both of these are in the Shihlin District to the north of the city center and north of the Keelung River. Both areas represent a combination of enclaves of government provided housing for senior executives, housing associated with two universities, and higher class housing in the private sector that has come about in association with existing housing. In addition, the far northern area, known as Tien Mou, is an area that was once American military, and is now populated by a large number of foreigners and upscale locals. Lastly, the western tip of the northern area corresponds to an area known as Peitou which has been an upscale area since Japanese colonial times. (At that time it was a resort area for senior members of the government and for leading citizens). Again, the patterns exhibited correspond to the perceived residential pattern of the city.

The negative loadings describe the opposite end of the social scale. The population described is native to the region. It is a population that is poorly educated, with a primary or junior high educational level being common, and a high rate of illiteracy being exhibited. The population, reflective of educational levels, is largely engaged as either production or construction labor. Those not so employed largely function as sub-contractors to larger industrial concerns. This is confirmed by the high score in the housing variable that describes a combined residential-manufacturing housing unit. Lastly, the factor describes a population that exhibits families with a high concentration of children under the age of 15; as well as births in the 12 months preceding the census.

The last points described, the number of children and the birth rate, present an interesting sidelight. As can be found in most

countries of the world, Taipei residents exhibit birth rates that are correlated to social status and income. The more educated, more economically successful segment of the population described in the positive sector of Factor Two do not have family sizes or birth rates that deviate from the mean. However, the poorer, less educated segment described in the negative side of the dimension exhibits a significantly higher rate than the average. The population described has a disproportionate share of both children and births. This is particularly significant given the traditional social structure in Chinese society that promoted extended and large families; particularly the drive to have a number of male heirs. Male heirs represented security in old age, and insured that the family name and line would continue. Even today the drive to have male children remains, and while the average number of children per family in Taiwan is 2.2, the ideal family has three, two boys and one girl.It can be theorized that the higher educated segment of the population has experienced demographic transformation, while the lower educated element has not. This would indicate that industrialization and economic success is transforming the traditional cultural patterns.

The segment of the population described by the negative loadings in Factor Two tend to be concentrated in the area west of the city proper, and west of the Tamshui River (see Figure XII). The largest concentrations of the described population are located in and around the cities of Sanchung, Hsinchuang and Shulin. Additional areas are located to the south of the center city around the city of Panchiao. Lastly, significant concentrations of the described population are found in the older sections of the central city. In particular large concentrations

can be found in the central city districts of Tatung and Yenping. This is not surprising as these districts were the heart of the Taiwanese districts during the Japanese colonial period. Again, the mapped pattern reflects a high degree of correlation to the perceived pattern.

Factor Three: Stage in the Family Life Cycle-New Housing and Growing Families/Older Housing and Single Women

Factor Three explained 8.3 percent of the total shared variance. The variables which make up the positive and negative dimensions of this factor are presented in Figure XIII. The spatial distribution of the Factor is presented in Figure XIV. In general the positive loadings describe areas within the city that are undergoing significant growth and development. The negative scores describe those areas that are characterized by single females.

The positive variables reflect a mixed population. A major share of the population described by this factor is new to the areas scoring high on the Factor. The population has ...been mobile with either an intra-urban or inter-urban move within the five years preceding the census. It is a population that is moving into houses built after 1976 and living in areas characterized by low rise apartment buildings built after 1976. The areas are high in population density, total population and households. Birth rates are high. In addition there is a segment of the population that has not been mobile within the past five years.

The mapped pattern for Factor Three indicates that the areas scoring high on this factor tend to be on the developing margins of the city. The areas scoring highly on the positive side include such 'outlying' districts as Neihu, Shihlin, Hsinchuang, Wuko, Hsintien and Shenkeng. This would be consistent with observation as well as expected

FIGURE XIII

Factor Three - Total Common Variance Explained-8.3%

High Loadings-Positive

Mobility/Origin

Percent of Total Population with intra-urban move in the past 5 years.

Percent of Total Population with inter-urban move in the past 5 years.

Percent of Total Population not moving in the past 5 years.

Housing

Percent of Total Housing Built Since 1976

Percent of Total Housing Units 4 story or less.

Demographic

Total Households

Percent of Total Population

Population Density

Concentration (LQ) of Live Birth Within the Past 12 Months.

High Loadings-Negative

Housing

Percent of Total Housing 10-19 Ping.

Percent of Total Housing Japanese Style

Percent of Total Housing Built from 1946-1975

Demographic

Percent of Total Population-Single Females

FIGURE XIV


FACTOR 3, 1980
Factor Score Intervals
greater than 2.0
1.0 to 1.9
0.0 to 0.9
0.0 to -0.9
-1.0 to -1.9
less than -2.0
District Boundaries
Principal Roads
Kilometers
0 1 2 3 4 5
N
Ronald D. Tielenbach 1988

results in a developing city. Taipei is a city undergoing tremendous growth. As the chief city of the country and the political and cultural center it is, in fact, attracting an almost disproportionate share of growth. Graff (1976) showed that the older central areas of the city had extremely high densities, and that the peak density center of the city was moving outward. In addition, in Chapter Three it was shown that the city had expanded outward over time. The mass of people fueling the growth of the city cannot all be absorbed in the older confines of the urban area. To accommodate an expanding population the city is moving outward; and land that was once farmland is being converted to urban uses. This clearly consistent with the positive side of the factor. The areas scoring highly on the positive side are regions that are either being converted from rural to urban uses, or are older urban areas being redeveloped in response to market demands. While there are no socially descriptive variables contributing to the factor, it can be theorized that the segment of the population being described is comprised of younger families (as illustrated by the high birth rates) and successful enough to move into newer housing, but not well enough off to afford more desirable locations or the high rise apartments favored by the wealthy. This theory does hold up based on field checks and informal interviews in the areas described.

The negative side of Factor Three describes a radically different segment of the population. Simply put, it is a population of single females. The female population group inhabits areas characterized by small houses (10-19 pings) and older housing stock, housing built before 1975 and much of it in the Japanese style.

The presence of a distinct population group of single females was anticipated. This group was identified in Hsu and Pannel's (1976) study and is described in the works of many anthropologists such as Gates (1982). A number of factors account for the spatial concentration of single females. Some of the concentrations, such as the area in Shihlin district just north of the Keelung River and Expressway intersection, or the areas in the districts of Kuting and Chingmei on the southern edge of the city proper, can be traced to the locations of Universities. The Shihlin district is home to Minchuan Women's College and the southern concentrations are adjacent to Taiwan Normal University and National Taiwan University. The concentrations sprinkled throughout the urban area usually reflect the employment structure in Taiwan. As in many developing countries, young, female labor is in high demand. Industries such as electronics assembly and textiles often prefer women employees. This can be traced to the comparative advantage exhibited by this group in manual dexterity, and the fact that employers can often pay significantly lower wages. Young woman are recruited from throughout the country to fill these types of positions. Housing is often provided by the employer in a "dormitory district". Such areas serve as magnets for other young women who are migrating to the city or who are city residents looking to establish residency separate from their families. A final element that one can speculate plays a role in the pattern (albeit a small one) would help explain the presence of concentrations in parts of Sungshan district and in the general area of Lungshan. Both districts have neighborhoods that could be described as "red light" entertainment areas. Further, it was mentioned to the author on numerous occasions that certain neighborhoods within Sungshan district had high

concentrations of "hsiao tai tai's" or mistresses of successful businessmen and government officials. This was confirmed by field checks and informal interviews of residents in the area, and with business people. While these checks did not provide absolute proof, indications were that this was true; and it certainly coincides with the perceptions of many of the city's residents.

Factor Four: Socio-economic Status-Employers and Entreprenuers/Laborers

Factor Four described 5.7 percent of the total shared variance. The variables that combine to form Factor Four are set forth in Figure XV. The spatial distribution of the factor is presented in Figure XVI. In general the positive factor loadings describe a middle class segment of the population that is native to the city. The negative scores describe a working class segment of the population and areas of the city that were developed in the high growth period of the 1960's to 1970's.

The population group and areas described by the positive loadings in Factor Four represent a traditional Taiwanese segment of the population that is native to the City. An examination of the mapped factor scores show that the factor is particularly strong in areas such as Lungshan, Chengchung, and Yenping. These are the older areas of the city, the core areas around which much of the present day City evolved. Further, they are areas that during the Japanese colonial period, were reinforced as Chinese areas. Field checks of the area indicate a profusion of traditional style Chinese shops selling everything from herbs and spices and other traditional foodstuffs to furniture and computers. The land

FIGURE XV

Factor Four - Total Common Variance Explained-5.7%

High Loadings - Positive

Mobility/Origin

Percent of Total Population Born in Taipei City

Housing

Percent of Total Housing From 50 to Over 100 Ping in Size

Percent of Total Housing More Than 4 Stories

Percent of Total Housing in Japanese Style

Percent of Total Housing-House/Commercial Combined

Economic

Percent of Total Labor Force Employed

Percent of Total Labor Force-Blue Collar

Percent of Total Labor Force-Sales/Service Labor

Concentration (LQ) of Employers

High Loadings - Negative

Mobility/Origin

Concentration (LQ) of Individuals Born in Hualien

Housing

Percent of Total Housing Units-Residential

" " " " -Built 1961-75

" " " " -20-29 ping

" " " " -Without Toilet

" " " " -Type Other

Than Listed

Economic

Percent of Labor Force in Production Labor

Demographic

Percent of Total Households

Percent of Total Population

FIGURE XVI


FACTOR 4, 1980
Factor Score Intervals
greater than 2.0
1.0 to 1.9
0.0 to 0.9
0.0 to -0.9
-1.0 to -1.9
less than -2.0
District Boundaries
Principal Roads
Kilometers
0 1 2 3 4 5
N
Ronald D. Tielenbach 1988

use pattern is dominated by very large structures that combine residential space with both warehousing and commercial/retail functions. This is not surprising given ...the proximity to the Tamshui River. Goods moving up and down river by boat would, traditionally, be unloaded adjacent to these districts and put in storage. The physical mixing of land uses not only reduced costs but provided security against thieves.

The variables combining in this Factor describe the observed reality. Housing is described by variables relating to extremely large size, height, style and function. The areas described contain a significant share of the region's housing larger than 50 pings, greater than four stories, of housing that is in the Japanese style and functions as both housing and commercial sites. The population is dominated by a larger than normal share of the labor force, the concentration of employers, and by those in the blue collar occupations; particularly sales and service.

The tsun/li scoring high on this factor do, as stated, exhibit the generated characteristics. The areas mentioned, as well as the scattering of such areas throughout the metropolitan region, are, essentially, the remaining areas developed in pre-colonial or colonial periods. They are the nodal points around which much of the early growth occurred. The ambiance of the districts is distinctly colonial, with Japanese/Victorian (Meiji) architectural styles prominent. The streets teem with people as the areas act as magnets for those seeking the diversity and range of traditional goods, particularly foodstuffs, not available in the more modern sectors of the city. The shops spill over on to the sidewalks and streets, yet a look inside will often show a cavernous space that serves (or perhaps served) as warehousing. Family

activity takes place in and among the commercial enterprises. In short, the areas described by this factor provide a cultural oasis in a rapidly homogenizing cityscape, an oasis that provides one with a glimpse of the past.

The negative loadings, on the other hand, describe a population and areas that are much more representative of the industrial growth of the 1950's, 1960's and 1970's. The residential structure described represents the type of housing built to provide space to a city that was undergoing rapid expansion as the economy boomed and rural migrants flooded to the City. The factor describes housing built in the boom period from 1961 to 1975, and being of moderate size, ranging from 20-29 ping. The areas are densely populated having an abnormal share of both population and households. The factor also describes areas and a population group dominated by those engaged in production labor.

This factor describes a large segment of the population and area of the metropolitan region. A perusal of the map shows that large areas of the city are associated with this factor. This is not unexpected. The factor describes a housing structure erected in the initial boom period of the economy. Certainly, that type of housing stock is prevalent, and the visitor or researcher is confronted by examples at every turn, and in almost every area of the city.The style of the housing is dominated by low-rise apartment blocks, almost uniformly constructed out of prestressed, poured concrete; and exhibiting a functional look that could almost be described as lacking in any architectural style. Simply put, the housing tends to be strictly functional.

The population described is also expected. Taiwan can be characterized as having an industrial economy. While jobs exist, and are

created, in the primary and tertiary sectors, the major share of existing and newly created jobs are in the secondary sector. The majority of people are dependent on this sector for their livelihood. The population described migrated to Taipei from other areas of the Island during the 1950's, 1960's and 1970's in response to the exploding industrial economy; and pushed out of rural areas by the declining need for agricultural labor and the explosion in population growth-and thus in the agricultural labor force. This group forms, it can be theorized, the largest single sub-group within the Taipei population. The broad regions scoring well on this factor are reflective of the development history of the city, being located in those areas that before 1950 were agricultural suburbs, as well as the continuing importance of the industrial sector. At the same time the areas which scored highest on the negative side are removed from the city center and are on the periphery of the city in locations such as Chungho, Hsintien and Chingmei. This reflects the geographic dispersal of industrial enterprises to outlying districts in the latter part of the development cycle. These areas are geographically proximate to a great number of large scale industrial enterprises and reflect residency patterns of industrial labor. They have not been favored sites for other population sub-groups.

Factor Five: Socio-economic Status- Blue Collar Company Employees/ Agricultural and Day Laborers

Factor Five describes 5.5 percent of the common or shared variance. The variables that combine to form Factor Five are set forth in Figure XVII. The factor scores for the observation sites are presented in Figure XVIII. In general, the positive Factor loadings

describe a lower class segment of the population, while the negative ones describe an upper/lower class or lower/middle class segment of the population.

The positive variable contributors to Factor Five describe a population that is self-employed without help or who may work for a relative for no compensation. It is a labor force that is collectively either blue collar or agricultural in nature. The housing described is either the traditional farm style or in a category other than one described by the census form. The farm style housing is most likely associated with the segment of the sub-group engaged as agricultural labor. The other category of housing is most likely associated with the blue collar segment of the population which is either self-employed or working for ...relatives. The type of housing that does not fit the published category can be diverse in nature. It can range from a knocked together 'shanty' in one of the few remaining areas of this style of housing, to sleeping space provided in a commercial enterprise. The space provided in stores would be exchanged for labor, particularly in guarding the enterprise in off hours. The limited use of the commercial space for housing purposes would not be sufficient to cause such space to be classified as combined residential/commercial housing units.

The factor scores for the positive dimension of the Factor are presented in Figure XVIII. The strongest areas of response are peripheral areas where the norm is farm style housing and agricultural labor. The more urban side of the dimension can be found in areas such as Chengchung near the original CBD of Taipei. The description offered

FIGURE XVII

Factor Five - Total Common Variance Explained - 5.5%

High Response - Positive

Economic

Concentration (LQ) of Self Employed Persons with no help

Concentration (LQ) of Those Working For Relatives For Free

Percent of Labor Force-Blue Collar

Percent of Labor Force-Agricultural Labor

Housing

Percent of Total Housing-Traditional Farm Style

Percent of Total Housing-Type Other Than Listed

High Response - Negative

Economic

Concentration (LQ) of Self Employed With No Help

Concentration (LQ) of Those Working For Relatives For Free

Percent of Labor Force-Blue Collar

Percent of Labor Force-Agricultural Labor

Housing

Percent of Total Housing-Traditional Farm Style

Percent of Total Housing-Type Other Than Listed

Mobility/Origin

Concentration (LQ) of Individuals Born In:

Ilan, Hualien, Taitung, Keelung

Economic

Percent of Labor Force in Private Construction

Percent of Labor Force in Mining

Percent of Labor Force in Production Labor

Percent of Labor Force-Blue Collar

Housing

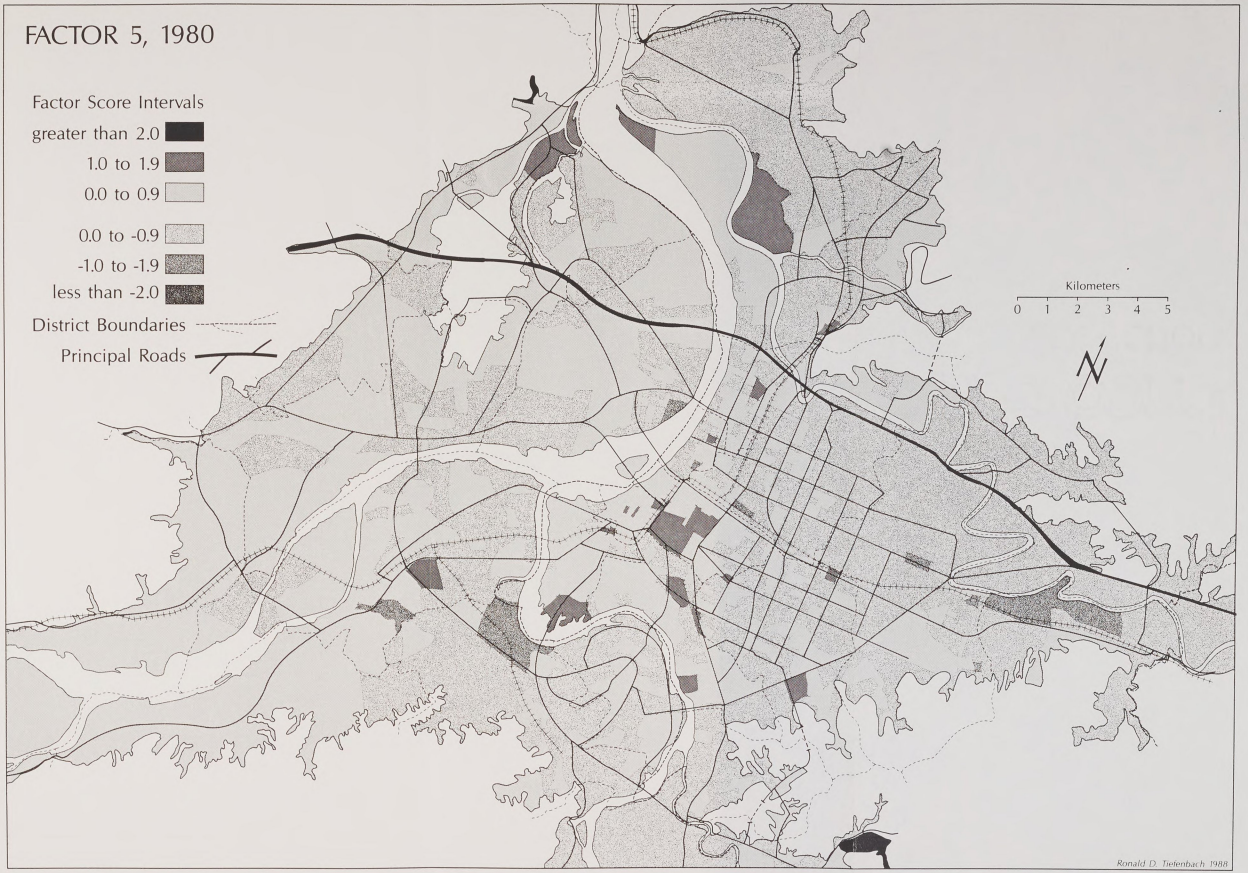
Percent of Total Housing-Supplied by Private Company

Education

Percent of Total Population With Vocational Education

Percent of Total Population With Senior Vocational Education

FIGURE XVIII



by the Factor does conform to the perceived reality. For example, the area of Chengchung being described is an area of intense commercialism, combining shopping and entertainment, particularly nightclubs and bars. It is an area that is alive with food stands, street peddlers and an extensive night market.

The variables that contribute to the negative side of this factor describe a blue collar segment of the population, engaged in such occupations as mining and construction. The population being described is characterized by having achieved some level of vocational education. As such it is likely to be a population that is engaged in crafts or trades and likely to be higher paid than a population sub-group engaged in similar occupations.(Factor Three described a similar group, but having less education. The difference can be thought of as the difference between an apprentice and a journeyman.) The population sub-group described lives in areas that have a disproportionately large share of the region's housing that is provided by the company. This would tend to reinforce the theory that the sub-group is in a specialized craft or trade, and thus form a valuable employee resource group. Also at work here, it can be theorized, is the same in-migration adaptation described in Factor One. The Factor indicates an abnormal concentration of the region's migrants from Ilan, Hualien, Taitung and Keelung. It would appear that the process of using previous migrants to Taipei from the home area as adaptive resources is in force. While at this point it can only be theorized, it does conform to past theory and provides an interesting area for further research.

The areas exhibiting the strongest negative factor scores for Factor Five are presented in Figure XVIII. Two strong response areas

exist to the south of the city proper in Yungho and Panchiao. An additional area of particularly strong response is to the west of the city proper near Nankang. Field checks of these areas indicate adjacent slopeland that is heavily mined, as well as numerous large scale factories with associated housing blocks.

Factor Six: Socio-economic Status- Government Employees/ Urban Poor

Factor Six explains 5.3 percent of the common or shared variance of the data base. The variables that combine to form the positive and negative dimensions of the factor are set forth in Figure XIX. The factor scores for the spatial units are presented in Figure XX. In general the variables that form the positive element of the factor describe a population that is middle to upper class and heavily representative of government official, both civilian and military. The variables that combine to form the negative dimension of the factor show the opposite end of the social spectrum, that is a population that is poor and illiterate.

The population outlined in the positive dimension of the Factor is a population that is white collar, in the military, or in the civilian government. Much of the population exhibits advanced vocational education. The areas contributing to the positive dimension show a disproportionate share of the region's government owned housing, as well as housing built in the period from 1946-1960. The areas in question also exhibit a higher than normal share of total population.

FIGURE XIX

Factor Six - Total Variance Explained - 5.3%

High Scores - Positive

Mobility

Concentration (LQ) of Total Population Born In Lianchang

Housing

Percent of Total Housing Government Supplied

Percent of Total Housing Built 1946-60

Employment

Percent of Labor Force-Military

Percent of Labor Force-Government Construction or Service

Percent of Labor Force-White Collar

Education

Percent of Total Population With Vocational Education

Percent of Total Population With Senior Vocational Education

Demographic

Percent of Total Population-15 - 65 Years Old

High Scores - Negative

Mobility/Origin

Percent of Total Population Born in Taichung

Tainan City or Hualien

Housing

Percent of Total Housing-Privately Owned

" " " -No Piped Water

" " " -Traditional Toilet

" " " -Traditional Farm Style

" " " -Built Before 1945

" " " -40-59 Ping

Economic

Percent of the Labor Force-Agricultural Labor

" " -Private Construction

" " -Employers

" " -Employed

" " -Self Employed No Help

" " -Working For Relatives for Free

Education

Percent of Total Population-Illiterate

Demographic

Percent of Total Population- 0-14 years old

Percent of Total Population-Female 65+

Percent of Total Population-Female Handicapped

FIGURE XX


FACTOR 6, 1980
Factor Score Intervals
greater than 2.0
1.0 to 1.9
0.0 to 0.9
0.0 to -0.9
-1.0 to -1.9
less than -2.0
District Boundaries
Principal Roads
Kilometers
0 1 2 3 4 5
N
Ronald D. Tiefenbach 1988

This dimension is also an expected dimension, and its emergence can be found in the developmental history of the City. In the period following the defeat of the ...Kuomnintang on the Mainland of China and the retreat to Taiwan in 1949, the island was not an economic powerhouse. The Japanese had developed the primary sector of the economy and put in place a reasonably good transportation system in the years before 1945. In addition small commercial, industrial and service sectors of the economy were in place. The political and social upheavals experienced by Taiwan after the end of WWII and Retrocession inhibited growth of the domestic economy. In 1949 more than a million people moved en masse to the Island. A good part of those people were the remnants of the KMT armies led by Chiang Kai-shek. Within the city of Taipei elements of that migration occupied the areas of the city vacated by the colonial rulers. During the 1950's significant attempts were being made to reorganize agriculture through land reform, and to stimulate other sectors of the economy. Remember though, this period in history is a period of high tension, particularly in Asia. Not only did the KMT arrive with a siege mentality and a desire to rebuild the shattered military and governmental structure, but the Korean Conflict with its associated domino theory, fanned the flames. Within Taipei, although the groundwork was being laid for an economic miracle; the expanding sectors of the economy were the military and the government. Both offered a level of economic security unavailable in the general economy. The development of the military and governmental sectors in terms of employment, was accompanied by development of enclaves to house those employed. Many of those sites that were being developed were within the Taipei Metropolitan Region which was fast emerging as the principal city

of the Republic of China. The white collar, middle class that began to expand in this period had strong ties to the ruling party and new middle class housing developments began to sprout up in the geographical vicinity of the government enclaves.

Factor Six identifies the remaining elements of this distinct group. It is the (presumably) aging elements of the middle class of the 1950's whose fortunes were tied to the military and governmental expansion by the KMT in Taiwan. Although information concerning the social identification as 'Mainlander' and 'Taiwanese' could not be obtained; one can theorize that the population subgroup identified by this factor represents the remaining elements of first generation immigrants from the mainland, as well as those in succeeding generations who continue to socially identify as 'mainlanders', a social identification that is spatially expressed. In earlier studies of Taiwan researchers often used variables that clearly identified the point of origin of city residents. The researchers had variable categories that included, as points of origin, all provinces on the Chinese mainland. From this data base they were able to establish which groups were recent immigrants from the mainland. This was important as the Mainlander-Taiwanese split was generally accepted as both real, and as an integral part of the social, economic and governmental matrices. This split was actualized in Taiwanese society in a manner similar to ethnic splits in the population in other countries. In Taiwan it was generally believed that the Mainlanders had control of the political process, while the Taiwanese controlled much of the economy. These categories have been dropped from the published census data. While no official reason could be found for their disappearance, informed speculation,by a

variety of interviewees, held that these categories had been eliminated in order to downplay domestic divisions in the population. Whatever the reason is, it does represent a fundamental shift within a government that prior to this time had used the diverse regional base of the population as a major underpinning in its claim to being the sole, legitimate government of China.

The scores mapped for Factor Six on Figure XX, would tend to validate the belief that this group represents the remnants of the Mainlanders. The concentration of strong response sites in the central city area corresponds to the area extending out Jen Ai Boulevard that was the heart of the Japanese residential district. It is an area that is, today, dominated by the massive Chiang Kai-shek memorial, and extending eastward from there along the Boulevard. This is an area that formed one of the initial residential districts for government officials in the 1950's. The map shows that various areas of strong response extend quite a distance eastward from the Chiang Kai-shek memorial. This reflects not only additional government/military compounds, but middle class housing that arose in geographic proximity to these (in the 1950's) centers of social prominence and political power.

In more recent times many of the pure military establishments in the city proper regions have been converted to other uses. A prime example would be the new World Trade Center complex in Sungshan district that is built on the site of a former military arsenal. Nevertheless scattered sites, although smaller, do still exist in scattered locations in the city proper. However, many of the high factor score sites in the city proper are reflective of enclaves of government owned civilian housing. For example the strong response in the southeast portion of the

map in the Kuting district corresponds with the housing complexes associated with the National Taiwan University. A similar complex, and area of high factor scores can be found in the extreme eastern portion of the map, to the southeast of the district center of Nankang. This concentration corresponds to the extensive complex associated with Academia Sinica.

Conversely, the areas to the north of the city exhibit different associations. The areas immediately north and south of the expressway are government complexes associated with the military. The large, rather odd shaped area, lying north of the expressway and along the banks of the Keelung River reflect a particularly large and extensive military complex. The area has a diversity of military agencies as well as extensive housing projects. The centerpiece of the mini-district is the 'Tomb to the Martyrs of the Revolution' a combination museum and memorial similar to a combination Tomb of the Unknown Soldier, Iwo Jima Memorial and other cultural monuments in Washington D.C.. The area that shows a strong response in the far northeast corresponds to a governmental enclave for high officials. Chiang Kai-shek maintained one of his homes in this area, and it is generally acknowledged that one of the many unofficial presidential homes is still in the vicinity. It is an area of large homes provided to senior government officials and extensive middle class housing in the immediate proximity.

In short, the pattern identified in the positive scores of Factor Six conforms to observations by the researcher, and the mental maps of those city residents interviewed for this project. It is felt that the regions established by the analysis do exist, largely in the locations

identified, and can be established with some degree of historical accuracy.

The variables which serve to describe the negative dimension of the factor describe the opposite end of the social spectrum. The population described contains a disproportionate share of the illiterate, the elderly and handicapped females, and those employed in agriculture and construction. It is a segment of the population that exhibits a significant share of small entreprenuers working alone, using the free help of relatives, or employing very few individuals. It is a segment of the population that has an extremely high birth rate as reflected by the presence of a statistically high share of children. The areas associated with the population contain a large share of the region's older housing, built before 1945, lacking piped water, having traditional bathroom facilities, built in traditional farm styles, and units privately owned and relatively large.

A perusal of the mapped scores for Factor Six presented in Figure XX does not present any significant surprises. The population and housing stock defined by the negative scores is spread across the entire metropolitan region with a few significant concentrations. It must be remembered that Taipei is a city that is experiencing significant growth and change. Spatial units, even though as small as the tsun/li, are aggregate levels. They can often contain a number of radically different population groups and housing types. The presence of up-scale, high rise housing in one part of the spatial unit does not preclude an area of the spatial unit characterized by traditional style housing. The presence of both types in a particular unit can, further, represent a significant variation from the normal amount of that type of housing for the

statistically average spatial unit. Thus, a given spatial unit, can exhibit strong responses (or factor scores) on a number of diverse factors. The broad pattern of spatial association with the factor can, in a sense, be thought of as a continuum.

The city of Taipei emerged and developed many years ago. At the height of the Japanese colonial period it was a fair sized city. Physical elements of that city do not disappear overnight, anymore than do the illiterate in an increasingly educated society. If this is recognized one can view the pattern as a continuum in which many locations have a weak association with the factor (that is, some elements of the population/housing structure being defined), other locations have a stronger tie and some locations a strong identification. It must also be remembered that not every household or individual exhibits every characteristic. The factor is a combination of variables and must also be thought of as a dimension.

This is not to downgrade the weak pattern of differentiation exhibited in much of the city. This demonstrates that the city is undergoing change. Even with the growth and development experienced in the past forty years, traditional elements of housing are still present on a widespread basis. Further, even with a high degree of social development, 'lower class' groups or groups such as elderly and handicapped females are still fairly widely distributed over a large geographic area. It can be theorized from the above information, that to some degree traditional patterns of social arrangement are still in force, particularly in the middle and lower class areas. In these areas we find significantly less social sorting based on age, class etc. It can also be theorized that the extended family structure may retain more

strength and flexibility in these areas than in others; something that is traditionally characteristic of Chinese society. At the same time, areas such as the one in the northeast of the city proper, east of Sungshan airport, and extending south into the Taan district exhibit a much stronger association with the Factor structure. This could indicate areas resistant to change, not yet redeveloped, or perhaps areas of emerging distinctiveness related to western style social sorting. The overall pattern is interesting, and is one that demands further study particularly in tracking the changes that occur by the time of the 1990 census.

Factor Seven: Socio-economic Status- Poor Blue Collar and Service Workers/Poor Elderly and Handicapped

Factor Seven accounts for 5.3 percent of the total shared variance. The variables which combine to form the positive and negative elements of the dimension are set forth in Figure XXI. The factor scores of the spatial units is presented in Figure XXII. In general the positive elements of the dimension describe a blue collar population group inhabiting poorer regions of the city. It is a group that is largely native to the City. The negative scores describe an older segment of the population living in reduced circumstances and in areas with a disproportionate share of the city's vacant housing.

The positive loadings indicate a population group that is native to Taipei. It is a blue collar labor force and heavily represented in the sales and service fields. It is a group that has a spatial association with housing situations in which essential kitchen and bath facilities are shared by households, by housing built before 1945

FIGURE XXI

Factor Seven - Total Variance Explained - 5.3%

High Scores - Positive

Mobility/Origin

Concentration (LQ) of Population Born in Taipei City

Housing

Percent of Total Housing-Share Bath

Share Kitchen

Share Piped Water

Share Modern Toilet

Share Trad. Toilet

Built Before 1945

Occupied

Japanese Style

Rental-Private

House/MFG Combined

House/Commercial

Combined

Employment

Percent of Labor Force-Blue Collar

Percent of Labor Force-Sales/Service Labor

High Scores - Negative

Mobility/Origin

Concentration (LQ) Population Born In Taipei City

Concentration (LQ) Population Born In Taipei County

Housing

Percent of Total Housing-Vacant

No Piped Water

Without Kitchen

More Than 1 Person

Economic

Percent of Labor Force-Agricultural Labor

Percent of Labor Force-Self Employed-No Help

Education

Percent of Total Population-Self Educated

Demographic

Percent of Total Population- Over 65

Percent of Total Population-Handicapped

FIGURE XXII


FACTOR 7, 1980
Factor Score Intervals
greater than 2.0
1.0 to 1.9
0.0 to 0.9
0.0 to -0.9
-1.0 to -1.9
less than -2.0
District Boundaries
Principal Roads
Kilometers
0 1 2 3 4 5
N
Ronald D. Tielenbach 1988

and often in the Japanese style, or housing situations that combine residences with either commercial or manufacturing concerns. It is a group that by and large rents its housing, with ownership rates being low. Lastly, it is a group that is associated with areas in which vacancy rates are extremely low and occupancy rates among the highest in the city.

A review of the mapped scores for Factor Seven as presented in Figure XXII indicates that the described population is heavily represented in areas adjacent to the traditional CBD of the city. In addition, there are significant concentrations in locations such as northern Sungshan and western Neihu and in northern Shihlin. These concentrations are associated with older urban nodes, as well as major institutional complexes such as the Veterans Hospital complex in northern Shihlin. The Veterans Hospital region is home not only to a very large hospital complex but a number of associated institutions such as rehabilitation institutes and mental health facilities. These complexes require large amounts of labor, usually low paid, and draw large numbers of users. Many locate in the immediate vicinity and require the type of lower cost housing described. Another example of this type would be the heavy concentration in the near south of the city proper. The location in question is just south and east of where the rail line takes a 90 degree turn from a north-south orientation to an east-west one. This area is in the immediate vicinity of National Taiwan University Hospital and Medical School.

The variables which combine to form the negative segment of this dimension describe a population native to the region, that is self-educated, older and often handicapped, and either self-employed or

in agricultural labor. It is a population group that is associated with housing that lacks piped water and kitchens yet houses more than one person. It is, not surprisingly by western standards, associated with areas having abnormally high vacancy rates.

A review of the mapped scores in Figure XXII indicates that the population described is strongly associated with areas peripheral to the city proper, although scattered concentrations are present in the city. A comparison of the factor score map with the map of land use patterns of the Taipei Basin (see Appendix A) indicates that the areas associated with this dimension show a strong correlation with the slopeland land use category. The associated sites correspond to areas of slopeland. This slopeland is land lying 100 meters or more above seal level, and which is used for a variety of agricultural purposes. The described dimension dovetails with the observed land use pattern. Areas showing a strong association with the dimension within the city proper can be expected to a small degree in any city.

Factor Eight: Socio-economic Status- Female Labor Force/
Poor, Low Education, Mixed Land Use, Labor Force

Factor Eight explains 5.1 percent of the total shared variance. The variables that combine to form the positive and negative elements of the dimension are set forth in Figure XXIII. The factor scores for the observation sites are presented in Figure XXIV. In general the positive loadings describe a younger population that is economically very active and which has large numbers of single females, females in the work force and few children. The variables combining to form the negative side of the dimension describe a population which is dominated by self-educated

senior citizens and children. It is a population group which earns its wages as production labor or in self-employed small scale enterprises, often manufacturing concerns within the home.

The variables which form the positive segment of the dimension describe a non-native population, a population that is characterized by people from 15 to 64 years of age, by single females and females from 15-29, and a population with vocational educations. It is a population that, economically, is characterized by females in the work force, by sales, service and construction labor, by those working for relatives for free; and in general by the high numbers of residents simply working. The population sub-group lives in areas with a disproportionate share of housing units combined with businesses.

The map of the factor scores, Figure XXIV indicates that the heaviest association or concentration of those described by this dimension live in Chungshan district, an area immediately adjacent, (to the northeast), of the CBD. Field checks indicate an area that is dominated by mixed land uses although having a significantly large presence of high rise office buildings and tourist hotels. It is perceived as a desirable urban neighborhood, and in fact served as an upscale area before the emergence of a secondary upscale growth pole in central Sungshan district. That district has served as a secondary CBD and replaced the Chungshan district as the primary upscale area for the Taiwanese. The Chungshan district is, however, still perceived as a highly desirable residential district. The offices and hotels in the area, along with the Tatung Industrial Complex and vocational school serve as magnets to the younger elements of society, particularly unmarried females. The concentration of economically active people,

FIGURE XXIII

Factor Eight - Total Variance Explained - 5.1%

High Scores - Positive

Mobility/Origin

Concentration (LQ) Population Born In Taichung and Tainan

Housing

Percent of Total Housing-Residence/Business Combined

Economic

Concentration (LQ) Labor Force-Females

Working

-Construction

Labor

-Sales/Service

Labor

-Work For Free

For Relative

-Employed

Demographic

Percent of Total Population

Percent of Total Population-Single Females

-Females 15-29

-M/F 15-64 Years Old

Education

Percent of Total Population With Vocational Education

Percent of Total Population With Senior Vocational Education

High Scores - Negative

Housing

Percent of Total Housing-Residence/Mfg. Combined

Percent of Total Housing-More Than 1 Person

Education

Percent of Population- Self Educated

Economic

Percent of Labor Force-Production Labor

Percent of Labor Force- Self Employed No Help

Demographic

Percent of Total Population-0 to 14 Years Old

Percent of Total Population- 65 or older

FIGURE XXIV


FACTOR 8, 1980
Factor Score Intervals
greater than 2.0
1.0 to 1.9
0.0 to 0.9
0.0 to -0.9
-1.0 to -1.9
less than -2.0
District Boundaries
Principal Roads
Kilometers
0 1 2 3 4 5
N
Ronald D. Tielenbach 1988

particularly females from age 15 to age 29, combined with the absence of any statistically significant variation in the number of children, could lead one to theorize that the area represents a region that functions as a residential district for those in the household formation stage, who may move once more children are born. Lastly, the high percentage of housing that serves both residential and business purposes is consistent with the area. Being a desirable district, and one that is heavily populated by the economically active means that rents tend to be high. Significant savings can be achieved by combining uses within the housing unit. In addition, the presence of a significant sector of the economically active population, particularly the single female population, would indicate a population that, taken as a whole, can demonstrate significant purchasing power and disposable income. This serves to increase the number of businesses present in the area and serve to facilitate the combined usage.

The variables that combine to form the negative element of the dimension describe a population that is self educated, engaged in production labor or is self-employed with no help. It is a population that is characterized by children and those over 65 years of age. It is a population that is associated with housing that combines the residence with a manufacturing operation; and houses more than one person.

A review of Figure XXIV indicates that observation units that show a strong correlation with the dimension tend to be in the peripheral suburbs in such districts as Taishan and Wuku that lie to the west of the city proper, as well as in scattered neighborhoods in the industrial centers such as Sanchung, Hsinchuang and Panchiao.

Field checks in these areas indicate that the described housing type is indeed common. Many apartment units, particularly at street level, are open to the street, and have had the front half or more of the apartment converted to a manufacturing use. The manufacturing space will often contain such machinery as a mechanical loom, or an injection molding machine. The housing space serves as the workplace and family life takes place around and within the factory setting. The visual impression is one of poverty, but of a poor element that is attempting to succeed. The poorer nature of the group tends to be confirmed by the self-educated nature of the population and by combining that with the knowledge of the relationship that exists between education and income. Given the lower income and educational levels the significant number of children present is not unexpected. Worldwide there is a demonstratable correlation between birth rates and education/income. The presence of significant numbers of elders would indicate the continued persistence of the extended family, and most likely (based on observation) the use of the elders in child care so that the parents can both be freed up to bring in income.

Factor Nine: Stage in The Family Life Cycle- Elderly Poor/
Lower to Middle Class Young Families

Factor Nine explains 4.9 percent of the total shared variance. The variables which combine to form the positive and negative elements of the dimension are set forth in Figure XXV, and the scores for the observation sites are presented in Figure XXVI. In general the positive element of the dimension describes a population sub-group that can be characterized as a self-educated, elderly, living in single family homes that are small, substandard and rented. The negative elements of

FIGURE XXV

Factor Nine - Total Variance Explained - 4.9%

High Scores - Positive

Housing

Percent of Total Housing-No Kitchen

-No Toilet

-No Bath

-Share Traditional Toilet

-Built Before 1945

-Built 1946-1960

-Rental-Government Owned

-5 to 19 Ping

-Japanese Style

-Type Other Than Listed

-Other Than Listed Owner

Demographic

Percent of Total Households-Single Person Family

Percent of Total Population-65 Years or Older

Education

Percent of Total Population-Self Educated

High Scores - Negative

Mobility/Origin

Concentration (LQ) of Population With Inter-
or Intra-Urban Move Within Past 5 Years

Concentration (LQ) of Population Not Moved
In Past 5 Years

Housing

Percent of Total Housing- Without Bath
-With Kitchen
-20-29 Ping
-Rental-Private
-Built 1961-1975
-More Than 1 Person Household

Economic

Percent of Labor Force-Private Sector Construction Labor

Percent of Labor Force-Sales/Service Labor

Demographic

Percent of Total Population-0 to 14 Years Old

FIGURE XXVI


FACTOR 9, 1980
Factor Score Intervals
greater than 2.0
1.0 to 1.9
0.0 to 0.9
0.0 to -0.9
-1.0 to -1.9
less than -2.0
District Boundaries
Principal Roads
Kilometers
0 1 2 3 4 5
N
Ronald D. Tielenbach 1988

the dimension describe a population sub-group that can be characterized as a combination of mobile and settled with both living in multiple person households that are rented and that are sub-standard. It is a poor population that is in low paying labor situations and that tends to have large families.

The population described in the positive element of the factor is dominated by individuals over the age of 65 and living in single family households. This would indicate the absence of an extended family structure, at least in a residential sense. The population is largely self-educated; hardly surprising given the age characteristics and the relative lack of educational opportunities when they were children. Given the relationship between education and income it can be theorized that income is low, a circumstance further complicated by the apparent lack of extended family structure. This low income status is reinforced by the variables contributing to the housing segment of the positive dimension. The housing described lacks kitchen and bath facilities and require the sharing of traditional style toilets. The housing stock is older having been constructed prior to 1960. It is small, averaging 5 to 19 ping. Much of the housing stock is from the colonial period and built in the Japanese style. It is either rented from the government, or held in an undefined ownership structure.

A review of Figure XXVI, which shows the factor scores for the observation sites relative to Factor Nine, indicates a significant concentration of this style of housing in Chengchung in neighborhoods adjacent to the administrative center of the city. Much of the housing lies on the fringe of the neighborhood known as Hsi Men Ting, which lies along Chung Hua Road south of the intersection with Chung Hsiao Road.

This neighborhood spreads back westward from the indicated sites that lie parallel to the rail line. This is significant in that it is an area that in the 1950's was redeveloped as a neighborhood for retiring soldiers, in particular those soldiers who accompanied Chiang on the retreat from the mainland. The neighborhood included the development of a three story shopping mall parallel to the rail lines. The shopping mall was meant to provide economic opportunity for the veterans, and housing was associated. This would dovetail with the group being described by the dimension. The veterans, particularly the lower ranks, were many times forced by circumstances to abandon their natal families, and often their spouse and children in the Mainland. They often found themselves in later years as an aging population, forming single person households, and dependent on the government. Their housing would correspond to that requisitioned or built with limited resources in the 1950's in order to care for this population group. The scattered sites in other locations are most likely associated with government enclaves set aside for this population sub-group. Further research is indicated.

The variables which combine to form the negative aspect of the dimension describe lower class population sub-group. It is a sub-group that is similar to others described. It is a group made up of large numbers who have moved, either inter or intra-urban, within the past five years; as well as those who have not, but who have not moved up the economic ladder. It is a population group that exhibits the large families usually associated with the less well off; and a group that is engaged in labor in the construction, sales and service fields. The population forms more than one person households, but is forced to occupy substandard housing without kitchens or baths and of moderate

size, due to economic circumstances. While the housing is relatively recent, it is more reminiscent of the type of railroad flats created to service our own immigrant population in earlier years. The reduced economic circumstances, as well as the exploitive nature of the particular housing type, is confirmed by the overall rental pattern from private interests.

Figure XXVI shows the factor scores for observation sites relative to this dimension. Significant areas of concentration can be found in the area of Hsuangyuan, to the south of the CBD, in the areas along the Tamshui River. Addition significant concentrations can be found in the industrial suburb of Panchiao, in the industrial city of Sanchung, and in the industrial suburb to the north of Sanchung, Luchou, and in the older regions of Shihlin district. Other sites exist both in peripheral regions and within the city proper as well. It can be theorized that the style of housing, combined with the years built and the rental pattern have a possible explanation in the trickle down theory of housing. This housing may indicate the emergence of western style housing mechanisms. The housing stock was constructed during the initial boom period of post-WWII Taiwan. One can theorize that while some of the original inhabitants never progressed significantly in an economic sense, others did. Those that did may have moved onward and upward, retaining ownership of the original housing site for investment purposes, and providing a housing market for recent in-migrants to the city. It is certainly a factor which deserves to be singled out and investigated more thoroughly.

CHAPTER FIVE

CONCLUSIONS

Evaluating the Hypothesis

The hypothesis for this study stated, in essence, that separation between the factors of socio-economic status, stage in the family life cycle, and ethnicity would be present in the Taipei of 1980. The question then is do we accept the hypothesis or reject it?

Factor One can be characterized as a socio-economic dimension. It describes a population group that ranges from the lower to lower middle class. This is confirmed by the variables that contribute to the dimension. In education they range from illiteracy to senior vocational education. In light of the survey by the Institute of Economics at the Academia Sinica in Taiwan mentioned earlier, this would correlate to the lower end of the economic scale. In housing, the variables range from pre-WWII housing with no facilities to functional housing built more recently. The employment variables depict a population that is blue collar in its makeup. At the same time, a significant contribution to the dimension is made by a segment of the population age 65 and over. The question arises as to whether this indicates their inclusion due to age (stage of the life cycle) or income? Before assessing the answer to this question it is instructive to review the second factor extracted.

On the surface it would appear that Factor Two is also a socio-economic dimension. The positive and negative scores describe both

an upper class, highly educated population segment, and a poorly educated, lower class group. However, the negative scores in this factor include high concentrations of live births and children. Thus, the same type of situation exists as in Factor One.

This pattern is repeated throughout the entire Factor structure. It appears that there is no separation between the socio-economic and stage in the family life cycle dimensions. At the same time, Factor Three describes a population of single females, and Factor Six a group that displays the characteristics of being in the household formation stage.

The third expected dimension, ethnicity, was eliminated early in the study. The lack of data concerning places of origin outside of Taiwan made it impossible to authoritatively establish its existence. Although aspects of Factors Six and Nine can be interpreted as indicating mainland backgrounds in the population no absolute proof is present. Thus testing of the hypothesis must rest on the separation between socio-economic status and stage in the family life cycle.

At the same time, if we define ethnicity as place of origin, then indications are that this is still a factor in residential location. Earlier in this study the work of Gallin and Gallin (1974) and others was cited, showing that one of the mechanisms determining urban residential location traditionally, was place of origin. Many of the factors have as a component the variables identifying various origination points from around the island. In each case where they play a role it indicates that there exists in the associated locations a strong deviation from mean; or a greater than average concentration of individuals from those places of origin. In terms of the original

hypothesis, the ethnicity factor (if defined in this manner) is not separate from the others.

Given these conflicting patterns the hypothesis must be rejected. There is no clearly defined separation between the two dimensions that usually dominate the social landscape in other cities that have been studied. The pattern in Taipei would still seem to tend toward the pre-industrial model set forth by Sjoberg. The rich are clustered in the city center along the Tun Hua Road and Nanjing Boulevard axes. The middle class form the next ring and the poor and recent in-migrants form the outer boundaries. At the same time, significant deviations to this pattern exist. Factors Three and Six indicate groupings that are based on stage in the family life cycle, young females and household formation stage respectively. In addition, Factor Seven would indicate an elderly dimension within the social structure. Based on these the theory can be put forth that Taipei is in the process of change. That is, while the city does not yet exhibit a pattern similar to industrial cities in the West, it appears to be moving in that direction. At the least it points out the need to continue research of this type. If the city is indeed evolving into the Western pattern, geographers have the opportunity to significantly expand the disciplines knowledge concerning urban social processes.

However, the fact that the factor structure for Taipei does not meet the western model is only part of the evaluation. Abu-Lughod (1968) and Berry and Rees (1969) investigated the structure of non-western cities and formulated a set of 'necessary conditions' for factor separation, as well as a fuller set of expectations concerning the factors extracted. The residential structure for Taipei could fit either

of two 'factorial combinations' set forth by Berry and Rees (see Chapter Three for a full discussion of this theory). Combination Five in Berry and Rees's scheme indicates one type of factor being extracted, that of Socio-economic status. Combination seven, in the scheme, indicates a mixture of socio-economic status and family status; with further factors lumped under a general category of urbanization that includes elements of stage in the life cycle and ethnicity; but primarily consists of jobs associated with an urban environment, such as industrial.

On the whole, the first case (Combination Five) fits best, but with significant modification, or at least explanation. If one refers back to Abu-Lughod's (1968) 'necessary conditions' the situation in Taipei meets the conditions for all three factors. The reason that clear separation or 'disassociation' between the factors is not evident is explained by Abu-Lughod's set of conditions. In the case of disassociation between Socio-economic Status (SES) and Stage in the Family Life Cycle (LC), Abu-Lughod proposed that either of two conditions must be met. The first condition was that there was little or no association between social class and family type. Given that it was indicated that social class does exist in the residential market, as shown by the factor structure for Taipei, the question is, does an association exist between such class and family type. At this juncture the answer is not clear, given the lack of income data for the region. However, indications are that associations do exist. Earlier in this study the problems of obtaining accurate income data was discussed. One major problem related to the contributions to household incomes from the extended family structure. If social status is linked to income, and expressed in residential choice, then the fact that total income

reflects more than nuclear family contributions must be taken into account. In the research process for this project numerous young married couples were interviewed (on an informal basis). A common practice that was noted by the researcher, and acknowledged by many in society, was the practice of remitting a portion of the family income to parents (usually the husband's parents). The young marrieds consequently had reduced 'real' incomes that did affect residential choice. On the other hand, the relatives benefitting from the income transfers could afford housing that would appear to be beyond their means. This practice was not limited to remittances to parents. Under Confucian ethics the oldest son of a family bears special responsibility. It is not uncommon for the oldest son of the family to help other family members to purchase housing. In any event there does appear to be a link between family status and socio-economic status.

In Abu-Lughod's scheme, if association does exist between SES and LC then three criteria must be met for disassociation between the two factors to occur. The three criteria are:

a. clear distinction between stages in the family cycle, each stage being associated with a change of residence

b. that subareas within the city offer, at all economic levels, the full range of housing suitable to families at particular points in the natural cycle of growth and decline.

c. cultural values permitting and favoring mobility to maximize housing efficiency, unencumbered by the 'unnatural' frictions of sentiment, local attachments or restrictive regulations (Abu-Lughod, 1968:132-33).

The social structure of Taipei does not appear to meet these criteria. First, there does not appear to be clear distinctions between stages in the family cycle, and certainly no absolute association of stages with a change in residence. Wang Su Chang (1981) in her investigation into residential choice mentions a trend in this direction, often motivated by the reputations of certain schools, but income often limits such mobility. It is not uncommon to see families domicile children with relatives in other parts of the city in order to take advantage of schools perceived as 'good', rather than moving themselves. Such moves are limited by income, the length of the journey to work, or in many cases by the sentiment and local attachments mentioned in Abu-Lughod's third condition. Secondly, not all subareas of the city offer a full range of housing at all economic levels to families at various points in the life cycle. For example, the upscale areas along Tun-hua North Road, Jen-ai Road, or the Tien-mu area offer virtually no housing to the poor or even lower middle-class family. Conversely, it does not appear as if any 'suitable' housing for upper-class families exists in the older districts of the city such as Yen-ping or Cheng-chung. In any event, the social structure of Taipei is not such, at the present time, that would necessarily result in the separation of the factors.

At the same time, it would appear that such separation might be present in the future. This study revealed significant groupings of elderly, students, young female workers and others. Wang Su Chang (1981) has identified a growing desire to change residence associated with the change in the family life cycle. Improved incomes, the development of more efficient transportation networks, and continuing urban development

and redevelopment should extend the options of families in the metropolitan area.

Thus, if we evaluate the study on the basis of Abu-Lughod's theory then Taipei does meet the criteria established. While Taipei's social structure does not show the same separation of factors as cities in the developed Western nations, it does fit urban theory as modified by Abu-Lughod, Berry and others as it applies to other regions of the world. While the hypothesis must be rejected, as it stated that in Taipei the same type of separation would exist as is present in cities located in developed countries of the West, urban theory is still applicable to Taipei. Taipei currently does not show the same separation of factors, but indications do exist that such separation might be present in the future. It is not the separation of factors in itself that is important. A similarity of pattern would, however, indicate that similar processes are at work in creating the residential pattern. In Taipei socio-economic class is the primary sorting factor that is currently in operation determining residential patterns. However, indications exist that stage in the family life cycle; as well as traditional sorting mechanisms such as place of origin, play a role as well.

Indications For Future Research

As discussed above future research of this type is indicated. In assessing the project at least three areas of investigation are suggested. These include examining specific social groups, conducting a time series analysis, and establishing the mechanisms involved in the residential process.

The Factorial Ecology that was conducted for Taipei in 1980 pointed up the presence of many unique social groups within the city. An example is the group identified in Factor Nine, the former soldiers. It is an aging group that is disappearing due to mortality. It is also in danger of losing its spatial concentration in the rebuilding process occurring around the central railroad station. It is an interesting group and one that is part of the living history of China. If investigation is to occur is must be done soon. Another group that would appear threatened is the one associated with the older neighborhoods in the city, and described in Factor Four. This area is immediately adjacent to the original CBD of the city. Its prime location makes it a logical candidate for renewal in a city that exhibits a tremendous dynamism in its growth process. The population of young women identified in Factor Three also bears attention. For example, much could be learned about the role of women in the development process, or perhaps about the changing role and status of women in a society in which traditional roles are being challenged by changing economic power. In any event Chapter Four tried to indicate the rich diversity of opportunity for future study that exists.

The second type of research that is indicated is a time series analysis. This research indicates that change in social groupings is occurring. Continued research in 1990, of the type envisioned by this work in its original formulation, has the potential for isolating those areas and groups most subject to change as the city develops. By concentrating on these groups, as well as the larger pattern, our knowledge of cities and how they develop, can be expanded. Many of the problems that faced this study can be avoided. For example, the district

and tsun/li boundaries are now known. Even if they are changed for the 1990 census, the baseline is established. The potential for significant research is there, and only awaits the new census.

Finally, more research needs to be done on the residential selection process in Taipei. This study made the assumption that the model developed and used as the standard in the West, was operative in Taiwan. The field research conducted for this study brought home the realization that such assumptions for the non-Western world are inappropriate. It may be that the process is similar in Taiwan, but to make the assumption without both regional knowledge and hard evidence reflects a kind of academic imperialism. In addition, if the patterns that are found are to be accurately explained such knowledge is of paramount importance.

APPENDIX A

APPENDIX A

FIGURE VII

TAIPEI BASIN, TAIWAN: LAND USE, 1983

APPENDIX B

APPENDIX B

FIGURE XVII

VARIABLES USED IN THE ANALYSIS OF CHICAGO BY BERRY/KASARDA

Demographic

Population-1960

Population Under 18 Years Old

Population Over 65 Years Old

Population Density

Percent of Total Population

Racial and Ethnic Characteristics

Percent of Population-Non-White

Percent of Population With at Least One Foreign Born Parent

Concentration (LQ) Polish

Concentration (LQ) German

Concentration (LQ) Italian

Concentration (LQ) Russian

Concentration (LQ) Irish

Concentration (LQ) Czech

Concentration (LQ) Swedish

Concentration (LQ) British

Concentration (LQ) Canadian

Concentration (LQ) Foreign Born

Concentration (LQ) Black

Concentration (LQ) Native White

Concentration (LQ) Other Non-Whites

Religious Characteristics

Percent of Population-Protestant

Percent of Population-Catholic

Percent of Population-Jewish

Income Characteristics

Percentage of Labor Force-White Collar

Percentage of Labor Force-Professional/Managerial

Percentage of Labor Force-Clerical/Sales

Percentage of Labor Force-Craftsmen/Operatives

Percentage of Labor Force-Laborers

Percentage of Labor Force-Service Occupations

Educational Characteristics

Median School Years Completed

Percentage of Population 25 and Older With 4 years High School or More

Mobility

Percentage of Families Who Moved In Past Five Years

Housing

Home Value

Percentage of Housing Units In 1 Unit Structures

Percentage of Housing Units In 2 Unit Structures

Percentage of Housing Units In 3 Unit or More Structures

Population per Household

Percent Owner Occupied Housing

Percentage of Housing Built Before 1940

Percentage of Housing Built 1940-1949

Percentage of Housing Built After 1950

Median Rent

Percentage of Housing Units-Sound (Meet Codes)

Percentage of Housing Units-Overcrowded

Employment Characteristics

Percentage of Labor Force Unemployed

Total Unemployed

Percentage of Women 14 and Older in the Labor Force

Percentage of Workers Commuting By Car

Percentage of Workers Commuting By Bus

Percentage of Workers Commuting By Train

Percentage of Workers Commuting By Foot

Source: Berry and Kasarda, 1976

APPENDIX C

APPENDIX C

FIGURE XXVIII

VARIABLES USED IN HSU AND PANNELL'S STUDY OF TAIPEI

Demographic Characteristics

Total Population

Percent of Population Younger Than 15 Years Old

Percent of Population Over 65 Years Old

Percent of Population 15-65 Years Old

Percent Population Age Over 15 and Single

Percent Population Age Over 15 and Single

Native Place Characteristics

Percent Native Population

Percent Taiwanese Population

Percent Mainland Population

Educational Characteristics

Percent Population With High Education

Percent Population With Secondary Education

Percent Population With Primary Education

Percent Population Self Educated

Percent Population Illiterate

Employment Characteristics

Percent Population-Employers

Percent Population-Own Account Workers

Percent Population-Wage and Salary Workers (Government)

Percent Population-Wage and Salary Workers (Private)

Percent Population-Unpaid Family Workers

Industrial Characteristics

Percent of Population in Agriculture

Percent of Population in Mining

Percent of Population in Manufacturing

Percent of Population in Utility Work

Percent of Population in Construction

Percent of Population in Commerce

Percent of Population in Transportation/Storage/Communications

Percent of Population in Banking/Insurance/Real Estate/Service

Percent of Population in Social and Personal Service

Occupational Characteristics

Percent of Population-Professional/Technical and Related Workers

Percent of Population-Administrative Workers

Percent of Population-Clerical Workers

Percent of Population-Service Workers

Percent of Population-Farmers, Fishermen, Related Workers

Percent of Population-Operators of Production and Communication Equipment and Physical Laborers

Source: Hsu and Pannell, 1976

APPENDIX D

APPENDIX D

FIGURE XXIX

VARIABLES GATHERED IN THE TAIWAN AREA CENSUS

Total Families

Total Population

Total Population-Male

Total Population-Female

Total Housing Units-One Person

Total Population-One Person Household

Total Population-Male-One Person Household

Total Population-Female-One Person Household

Total Households-More Than One Person

Total Population-More Than One Person

Total Population-Male-More Than One Person

Total Population-Female-More Than One Person

Total Households-House/Business Combined

Total Population-House/Business Combined

Total Population-Male-House/Business Combined

Total Population-Female-House/Business Combined

Total Population-Male-0 to 4 Years Old

Total Population-Female-0 to 4 Years Old

Total Population-Male-5 to 9 Years Old

Total Population-Female-5 to 9 Years Old

Total Population-Male-10 to 14 Years Old

Total Population-Female-10 to 14 Years Old

Total Population-Male-15 to 19 Years Old

Total Population-Female-15 to 19 Years Old

Total Population-Male-20 to 24 Years Old

Total Population-Female-20 to 24 Years Old

Total Population-Male-25 to 29 Years Old

Total Population-Female 25 to 29 Years Old

Total Population-Male 30 to 34 Years Old

Total Population-Female 30 to 34 Years Old

Total Population-Male-35 to 39 Years Old

Total Population-Female-35 to 39 Years Old

Total Population-Male-40 to 44 Years Old

Total Population-Female-40 to 44 Years Old

Total Population-Male-45 to 49 Years Old

Total Population-Female 45 to 49 Years Old

Total Population-Male-50 to 54 Years Old

Total Population-Female-50 to 54 Years Old

Total Population-Male-55 to 59 Years Old

Total Population-Female-55 to 59 Years Old

Total Population-Male-60 to 64 Years Old

Total Population-Female-60 to 64 Years Old

Total Population-Male- 65 or Over

Total Population-Female-65 or Over

Total Population-Single-Male

Total Population-Single-Female

Total Population-Married-Male-Live With Spouse

Total Population-Married-Female-Live With Spouse

Total Population-Male-Separated or Divorced

Total Population-Female-Separated or Divorced

Total Population-Male-Widower

Total Population-Female-Widow

Total Population-Male-Literate

Total Population-Female-Literate

Total Population-Male-Graduate of Graduate School

Total Population-Female-Graduate of Graduate School

Total Population-Male-Attending Graduate School

Total Population-Female-Attending Graduate School

Total Population-Male-Have BA

Total Population-Female-Have BA

Total Population-Male-Attending University

Total Population-Female-Attending University

Total Population-Male-Graduate of 2/3 Year College

Total Population-Female-Graduate of 2/3 Year College

Total Population-Male-Attending 2/3 Year College

Total Population-Female-Attending 2/3 Year College

Total Population-Male-Graduate of 5 Year Junior Coll.

Total Population-Female-Grad. of 5 Year Junior College

Total Population-Male-Attending 5 Yr. JC-In Last 2 Yrs.

Total Population-Female-Attending 5 Yr. JC-Last 2 Years

Total Population-Male-Attending 5 Yr. JC-First 3 Years

Total Population-Female-Attending 5 Yr. JC-First 3 Years

Total Population-Male-High School Graduate

Total Population-Female-High School Graduate

Total Population-Male-Attending High School

Total Population-Female-Attending High School

Total Population-Male-Graduate-Senior Vocational School

Total Population-Female-Graduate-Senior Vocational School

Total Population-Male-Attending Senior Vocational School

Total Population-Female-Attending Senior Vocational School

Total Population-Male-Graduate Junior Vocational School

Total Population-Female-Graduate Junior Vocational School

Total Population-Male-Attending Junior Vocational School

Total Population-Female-Attending Junior Vocational School

Total Population-Male-Graduate of Junior High

Total Population-Female-Graduate of Junior High

Total Population-Male-Attending Junior High

Total Population-Female-Attending Junior High

Total Population-Male-Graduate of Primary School

Total Population-Female-Graduate of Primary School

Total Population-Male-Attending Primary School

Total Population-Female-Attending Primary School

Total Population-Male-Self Educated

Total Population-Female-Self Educated

Total Population-Male-Illiterate

Total Population-Female-Illiterate

Total Population-Male-Economically Active

Total Population-Female-Economically Active

Total Population-Male-Currently Employed

Total Population-Female-Currently Employed

Total Population-Male-Looking for Work

Total Population-Female-Looking for Work

Total Population-Male-Looking for 1st Job

Total Population-Female-Looking for 1st Job

Total Population-Male-Not Economically Active

Total Population-Female-Not Economically Active

Total Population-Male-Housekeeper

Total Population-Female-Housekeeper

Total Population-Male-Student

Total Population-Female-Student Total Population-Male-Old/Handicapped

Total Population-Female-Old/Handicapped

Total Population-Male-Not Described by Econ. Categories

Total Population-Female-Not Described by Econ.Categories

Total Population-Male-Job in Agriculture/Forestry

Total Population-Female-Agriculture/Forestry

Total Population-Male-Fishing

Total Population-Female-Fishing

Total Population-Male-Mining

Total Population-Female-Mining

Total Population-Male-Job in Manufacturing

Total Population-Female-Job in Manufacturing

Total Population-Male-Job in Utilities

Total Population-Female-Job in Utilities

Total Population-Male-Building or Architecture

Total Population-Female-Building or Architecture

Total Population-Male-Commercial-Self Employed

Total Population-Female-Commercial-Self Employed

Total Population-Male-Job in Transportation

Total Population-Female-Job in Transportation

Total Population-Male-Banking,Accounting-Finance

Total Population-Female-Banking,Accounting,Finance

Total Population-Male-Public Administration,
National Defense

Total Population-Female-Public Administration
or National Defense

Total Population-Male-Other Service Job

Total Population-Female-Other Service Job

Total Population-Male-Special Technician

Total Population-Female-Special Technician

Total Population-Male-Private Co. Administration

Total Population-Female-Private Co. Administration

Total Population-Male-Guide/Guard

Total Population-Female-Guide/Guard

Total Population-Male-Commercial Sales,Buyer,Labor

Total Population-Female-Commercial Sales, Buyer

Total Population-Male-Service Labor

Total Population-Female-Service Labor

Total Population-Male-Primary Sector Labor

Total Population-Female-Primary Sector Labor

Total Population-Male-Production Labor

Total Population-Female-Production Labor

Total Population-Male-Military

Total Population-Female-Military

Total Population-Male-Employer

Total Population-Female-Employer

Total Population-Male-Self Employed-No Help

Total Population-Female-Self Employed-No Help

Total Population-Male-Government Construction

Total Population-Female-Government Construction

Total Population-Male-Private Sector Construction

Total Population-Female-Private Construction

Total Population-Male-Work for Relative-No Wage

Total Population-Female-Work for Relative-No Wage

Total Population-Born In- Tapei County

" " " Ilan

" " " Taoyuan

" " " Hsinchu

" " Miaoli

" " " Taichung

" " " Changhua

" " " Nantou

" " " Yunlin

" " " Chiayi

" " " Tainan

" " " Kaohsiung

" " " Pingtung

" " " Taitung

" " " Hualien

" " " Pinhu

" " " Keelung

" " " Taichung City

" " "	Tainan City
" "	Taipei City
" " "	Kaohsiung City
" " "	Kinmen
" " "	Lianchang
" " "	Pong Sya Island
" " "	Nan Sya Island
" " "	Other Provincial City
" " "	Foreign Country
Total Population-Work In-	Taipei
" " "	Ilan
" " "	Taoyuan
" " "	Hsinchu
" " "	Mialoi
" " "	Taichung
" " "	Chunghua
" " "	Nantou
" " "	Yunlin
" " "	Chiayi
" " "	Tainan
" " "	Kaoshiung
" " "	Pingtung
" " "	Taitung
" " "	Hualien
" " "	Pinhu
" " "	Keelung City
" " "	Taichung City

" " " Tainan City

" " " Taipei City

" " " Kaoshiung City

" " " Kinmen

" " " Lianchang

" " " Dong Sya Island

" " Nan Sya Island

" " " Other Prov./City

" " " Foreign Country

Total Population Living in Same Place 5 Years Ago

Total Population Living in Same District Different LI

Total Population Living in Same City-Different District

Total Population Living in Different County/City

Total Population Living 5 Years Ago Taipei

" " " Ilan

" " " Taoyuan

" " " Hsinchu

" " " Miaoli

" " " Taichung

" " " Chunghua

" " " Nantou

" " " Yunlin

" " " Chiayi

" " " Tainan

" " " Kaoshiung

" " " Pingtung

" " " Taitung

" " " Hualien

" " " Pinhu

" " " Keelung City

" " " Taichung City

" " " Tainan City

" " " Taipei City

" " " Kaoshiung City

" " " Kinmen

" " " Lianchang

" " " Dong Sya Island

" " " Nan Sya Island

Total Population First Married at Less Than 15

Total Population First Married at 15

" " " 16

" " " 17

" " " 18

" " " 19

" " " 20

" " " 21

" " " 22

" " " 23

" " " 24

" " " 25

" " " 26

" " " 27-29

" " " Over 30

Total Number of Live Male Births

Total Number Female Live Births

Total Number Surviving Male Infants

Total Number Surviving Female Infants

Number of Male Live Births in Last 12 Months

Number of Female Live Births in Last 12 Months

Surviving Males Born in Past 12 Months

Surviving Females Born in Past 12 Months

Variables 269 to 320 provide information in all educational categories, and in marital status for those less than 15 years old.

Total Housing Units

Total Occupied Housing Units

Total Vacant Housing Units

Total Non-Residential Housing Units

Total Residential Units

Total Residence/Manufacturing Combined Units

Total Residence/Commercial Combined Units

Total Residence/Other Use Combined Units

Total Units Built Before 1945

Total Units Built 1946-1960

Total Units Built 1961-1975

Total Units Built 1976-1977

Total Units Built 1978-1979

Total Units Built 1980-

Total Units-Traditional Farm Style

Total Units-Villas

Total Units-Japanese Style Units

Total Units-Apartments-4 Story and Less

Total Units-Apartments- More Than 4 Story

Total Units-Other Types

Total Units-Under 5 ping

Total Units-5-9 ping

Total Units-10-14 ping

Total Units-15-19 ping

Total Units-20-24 ping

Total Units-25-29 ping

Total Units-30-34 ping

Total Units-35-39 ping

Total Units-40-44 ping

Total Units-45-49 ping

Total Units-50-54 ping

Total Units-55-59 ping

Total Units-60-99 ping

Total Units-Over 100 ping

Total Units With Kitchen

Total Units Share Kitchen

Total Units No Kitchen

Total Units With Bath

Total Units Share Bath

Total Units No Bath

Total Units With Modern Toilet

Total Units Share Modern Toilet

Total Units Traditional Toilet

Total Units Share Traditional Toilet

Total Units No Toilet

Total Units Own Piped Water

Total Units Share Piped Water

Total Units No Piped Water

Total Units Private House

Total Units Public House

Total Units Other Type

Total Units Government Owned Rental

Total Units Privately Owned Rental

Total Units Government Provided

Total Units Private Company Provided

Total Units Other Type Ownership

APPENDIX E

APPENDIX E

FIGURE XXX

VARIABLES USED IN SOCIAL AREA ANALYSIS OF TAIPEI

Percent of Total Housing-Single Person Family

Percent of Total Housing-More Than One Person Household

Percent of Total Housing-House/Business Combined

Percent of Total Population-Male/Female- 0 to 14 Years

Percent of Total Population-Male 15-64

Percent of Total Population-Female 15-64

Percent of Total Population-Singe Male

Percent of Total Population-Single Female

Percent of Total Population-Male-Widower

Percent of Total Population-Male Over 65

Percent of Total Population-Female Over 65

Percent of Total Metropolitan Population

Percent of Total Population-Male/Female 2-3 Years+ College

Concentration (LQ) of Males/Females 2-3 Years or More Coll.

Percent Total Population-Male/Female High School Education

Percent Total Population-Male/Female Junior High School Ed.

Percent Total Population-Male/Female Vocational Education

Percent Total Population-Male/Female Primary Education

Percent Total Population-Male/Female Self Educated

Percent Total Population-Male/Female Illiterate

Percent Total Population-Economically Active

Percent Economically Active Population-Now Working

Percent Economically Active Population-Looking for Work

Percent Total Population-Female-Economically Active

Concentration (LQ) of High School Graduates

Concentration (LQ) of Male/Female Vocational Education

Concentration (LQ) of Male/Female Junior High School Ed.

Concentration (LQ) of Male/Female Primary School Ed.

Concentration (LQ) of Male/Female Illiterates

Concentration (LQ) Female Economically Active Population

Concentration (LQ) Male/Female Previously Working Now Looking

Concentration (LQ) Male/Female Employers

Concentration (LQ) Male/Female Self Employed-No Help

Concentration (LQ) Male/Female Private Sector Construction

Concentration (LQ) M/F Government Construction

Concentration (LQ) M/F Work For Relative For Free

Concentration (LQ) M/F Military

Concentration (LQ) Born in Taipei

Concentration (LQ) Born in Ilan

Concentration (LQ) Born in Taoyuan

Concentration (LQ) Born in Hsinchu

Concentration (LQ) Born in Miaoli

Concentration (LQ Born in Taichung

Concentration (LQ) Born in Changhua

Concentration (LQ) Born in Nantou

Concentration (LQ) Born in Yunlin

Concentration (LQ) Born in Chiayi

Concentration (LQ) Born in Tainan

Concentration (LQ) Born in Kaoshiung

Concentration (LQ) Born in Pingtung

Concentration (LQ) Born in Taitung

Concentration (LQ) Born in Hualien

Concentration (LQ) Born in Pinhu

Concentration (LQ) Born in Keelung

Concentration (LQ) Born in Taichung City

Concentration (LQ) Born in Tainan City

Concentration (LQ) Born in Taipei City

Concentration (LQ) Born in Kaoshiung City

Concentration (LQ) Born in Kinmen

Concentration (LQ) Born in Lianchang

Concentration (LQ) Born in Foreign Country

Concentration (LQ) Male/Female in Agriculture/Forestry

Percent Econ. Active Population M/F Blue Collar

Percent Econ. Active Population M/F White Collar

Percent Econ. Active Population M/F High Tech/Admin

Percent Econ. Active Population-Labor-Sales/Service/Guard

Percent Econ. Active Population-Labor-Agriculture

Percent Econ. Active Population-Military

Percent Econ. Active Population-Employers

Percent Econ. Active Population-Self Employed No Help

Percent Econ. Active Population-Production Labor

Percent Econ. Active Population-Government Construction

Percent Econ. Active Population-Private Sector Construction

Percent Econ. Active Population-Work for Relative for Free

Percent Econ. Active Population-Fishing

Percent Econ. Active Population-Mining

Total Housing Units

Total Households

Concentration (LQ) of Population Not Moved in Past 5 Years

Concentration of Population-Intra-urban Move in Past 5 Years

Concentration of Population-Inter-urban Move in Past 5 Years

Concentration (LQ) of Live Births in Past 12 Months

Concentration (LQ) of Surviving Infants Past 12 Months

Percent of Total Population Moved Within Past 5 Years

Percent of Total Housing Units-Occupied

Percent of Total Housing Units-Vacant

Percent of Total Housing Units-Non-residential

Percent of Total Housing Units-Residential Units

Percent of Total Housing Units-Residence/Manufacturing Comb.

Percent of Total Housing Units-Residence/Commercial Combined

Percent of Total Housing Units-Other Uses

Percent of Total Housing Units-Built Before 1945

Percent of Total Housing Units-Built 1946-1960

Percent of Total Housing Units-Built 1961-1975

Percent of Total Housing Units-Built 1976-1977

Percent of Total Housing Units-Built 1978-1979

Percent of Total Housing Units-Built 1980 on

Percent of Total Housing Units-Traditional Farm Style

Percent of Total Housing Units-Villa

Percent of Total Housing Units-Japanese Style

Percent of Total Housing Units-Apartments-4 Story/Less

Percent of Total Housing Units-Apartments-More Than 4 Story

Percent of Total Housing Units-Other Type

Percent of Total Housing Units-Under 5 ping

Percent of Total Housing Units-5-9 ping

Percent of Total Housing Units-10-19 ping

Percent of Total Housing Units-20-29 ping

Percent of Total Housing Units-30-39 ping

Percent of Total Housing Units-40-49 ping

Percent of Total Housing Units-50-59 ping

Percent of Total Housing Units-60-99 ping

Percent of Total Housing Units-100 or more ping

Percent of Total Housing Units-With Kitchen

Percent of Total Housing Units-Share Kitchen

Percent of Total Housing Units-No Kitchen

Percent of Total Housing Units-With Bath

Percent of Total Housing Units-Share Bath

Percent of Total Housing Units-No Bath

Percent of Total Housing Units-Modern Toilet

Percent of Total Housing Units-Share Modern Toilet

Percent of Total Housing Units-Traditional Toilet

Percent of Total Housing Units-Share Traditional Toilet

Percent of Total Housing Units-No Toilet

Percent of Total Housing Units-With Piped Water

Percent of Total Housing Units-Share Piped Water

Percent of Total Housing Units-No Piped Water

Percent of Total Housing Units-Private House

Percent of Total Housing Units-Public Housing

Percent of Total Housing Units-Other Type Unit

Percent of Total Housing Units-Rental-Government Owned

Percent of Total Housing Units-Rental-Private Supply

Percent of Total Housing Units-Government Supplied

Percent of Total Housing Units-Private Company Supplied

Percent of Total Housing Units-Other Type Ownership

Percent of Total Population-Male-15-29

Percent of Total Population-Female-15-29

Percent of Total Population-Female-65 and over/Handicapped

Median Age of Population

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