

Chapter Four

DEVELOPMENT OF MODELS AND DERIVATION OF HYPOTHESES ON HOUSING PREFERENCES

4.1 Introduction

We can believe what we choose. We are answerable for what we choose to believe.

Newman, John Henry
British cardinal and theologian (1801-1890)

The central research focus of this study is on housing preferences, and the way they are developing in Singapore. Having surveyed the relevant literature in Chapter Two and considered housing trends in Singapore in Chapter Three, this chapter sets out to develop conceptual models of housing preferences in Singapore. These, in turn, lead to an elaboration of the main research objective mentioned in Chapter One. The Coni-spherical model of housing preferences and three sub models are presented and explained, and their choice justified in this chapter. With the models developed, hypotheses on the various aspects of housing preferences are derived. Owing to the large number of attributes and factors to be considered, the null hypotheses are tabulated for ease of reference and comparison. The models presented in this chapter enable a systematic study of housing preferences of owner-occupiers to be carried out. The hypotheses are tested and results presented in Chapter Six and further explained in Chapter Seven. The following section sets out to justify the use of models in housing research.

4.2 Use of Models in Housing Research

The objectives for developing the housing models in this study are as follows:

- i. to identify various attributes and determinants which influence owner-occupiers' housing preferences
- ii. to provide the basis for statistical analysis of owner occupiers' housing preferences
- iii. to enable a thorough cross- disciplinary investigation into housing preferences to be carried out.

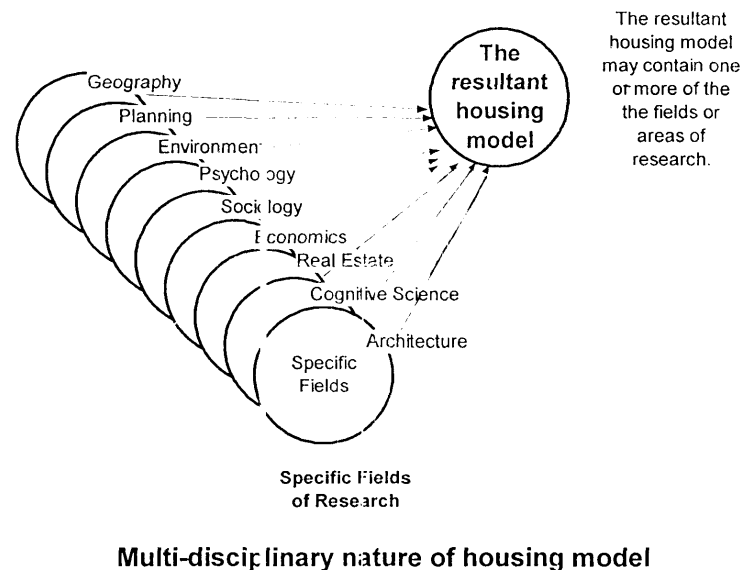


Figure 4-1 (Source: The Author,1995)

Figure 4-1 shows that models for housing research can be drawn from within a wide spread of academic and applied fields such as geography, planning, environment, psychology, sociology, economics, architecture, real estate and cognitive science. The models presented in this chapter are based on such a multi-disciplinary concept of modelling.

4.3 Development of Models

This section highlights a general conceptual model on housing preferences (see Figure 4-3 on page 73) and three sub-models, namely :

- (i) Model of Neighbourhood Preferences (see Figure 4-4 on page 75)
- (ii) Model of Precinct Preferences (see Figure 4-5 on page 77)
- (iii) Model of Housing Preferences (see Figure 4-6 on page 79)

The Coni-spherical Model of Housing Preferences

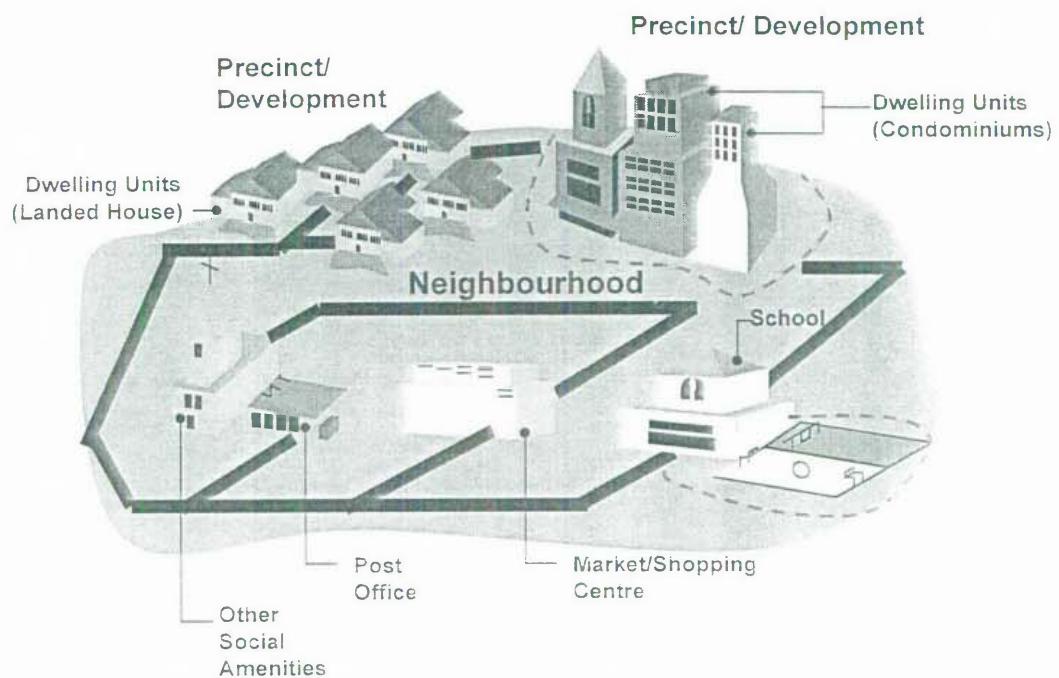
In most of the work cited earlier in this thesis, the emphasis has been on choice and decision making rather than on preferences. The inherent difference is that in reality individual owner occupiers are not sovereign decision-makers, instead they are highly constrained by a large number of factors. In the view of the author, the net effect of any of the constraints operating for the owner occupiers is to restrict much of the availability of choices. On the other hand, in the case of preferences, no choice whatsoever needs to be made. Indeed, this study is asking owner occupiers *ex-post* about their preferences rather than *ex-ante*. In other words, their preferences will, to a large extent, be constrained by their experiences and it is argued that they are reasonably realistic in their evaluations. The owner occupiers, it is assumed, will be talking less about their dreams and more about the reality of their situation.

The conceptual housing preferences model presented below is coni-spherical in form. This model is in the form of simple representation of the various attributes influencing the housing preferences of the owner occupiers. These attributes are grouped in such a way as to represent the various aspects of housing such as locational, economic, social, and environmental attributes. In this study, the owner occupiers rank or indicate their preferences with regard to the various attributes and are not drawn into discussion as to the process of housing search as in Cahill (1994). The proposed model incorporates Venn diagrams at three different points of preferences (see Figure 4-3 on page 73):

- i. area (neighbourhood)
- ii. precinct/development (estate)
- ii. dwelling unit (the block and housing unit)

Definitions of the neighbourhood, the precinct and the dwelling units may be relevant at this juncture.

Neighbourhood refers to the observable delimited geographical area in which neighbourliness may occur (Ching,1988:24). Figure 4-2 is a symbolic representation of what constitutes a dwelling unit, a precinct and a neighbourhood.



Symbolic representation of dwelling units, housing precincts/developments and neighbourhood.

Figure 4-2 (Source: The author, 1997)

Munro and Lamont (1985) have shown that resident perceptions of the concept and definition of neighbourhood vary widely between groups of the population. For the purpose of this study, neighbourhood is deemed to be a residential area with homogenous characteristics of a size comparable to that usually served by such social

amenities as schools, market, police posts and neighbourhood shopping centres. Neighbourhoods occur in various shapes and sizes. In the local context, a neighbourhood may contain various blocks of flats in the form of precincts and/or various private housing developments in the forms of terrace houses, condominiums or private apartments. As for precincts/developments, they are made up of a group of housing units within a condominium, a block of private apartments or a group of landed properties such as terrace houses etc. In this study, the emphasis is on these private housing developments. Eventually, it is the individual dwelling units that the individual owner occupier is concerned with. Lawrence (1987) emphasized that a dwelling unit is a physical unit that defines and delimits space for the members of a household. It provides shelter and protection for domestic activities.

Inspired by Weidemann and Anderson (1985), it is postulated that at each of these levels, the owner occupiers are influenced by two sets of factors, namely Personal Situational Factors and Socio-Economic cum Political Factors. Examples of these factors are :

- (i) **Personal Situational Factors :**
Family and educational background, social group, ethnic affiliation and financial status, lifestyle preferences and time budget (time available for non-work purposes and one's preferences for the allocation of such time)

- (ii) **Socio-Economic cum Political Factors :**
Supply and demand for different types of accommodation, locations, property price index, interest rates, government housing policies and economic performance.

The combined effects of these factors directly influence the individual owner occupier's preference for a particular area or neighbourhood. At this level, the considerations include:

- (i) Location and Amenities
- (ii) Environmental Attributes
- (iii) Social/Security Attributes

These attributes, being interrelated, are represented in a sub-model on neighbourhood (see Figure 4-4 on page 75). The considerations in all the three sub models are derived in part from the models by Smith and Clark (1982a and 1982b). As explained in Chapter Two, neighbourhood quality was of prime importance to respondents in their studies. Besides neighbourhood preferences, this thesis postulates that individual owner occupiers will also focus on the particular precinct or development (estate) before arriving at the most preferred dwelling unit. Here, it should be noted that most dwelling units, with the exception of detached houses, are located within a row in the case of terrace houses or a block in the case of apartments or condominiums.

Two other sub models are presented to highlight the essential attributes affecting preferences for precinct/development (see Figure 4-5 on page 77) and subsequently the dwelling unit (see Figure 4-6 on page 79). However, it should be emphasized that the whole process of deriving owner-occupier's housing preferences is a dynamic one and is not sequential as is suggested by Smith and Metz (1980:155). This is because, the examination of preferences of owner occupiers may begin at any level within the model shown in Figure 4-3 on page 73. Thus the housing preferences of an individual are not likely to remain invariable. In other words, though each of the sub-models may be viewed in its entirety, they are inter-related to each other. Nevertheless, in examining housing preferences of owner occupiers, it is logical to start with neighbourhood preferences. The factors affecting owner-occupiers' preferences are identified in this study as follows

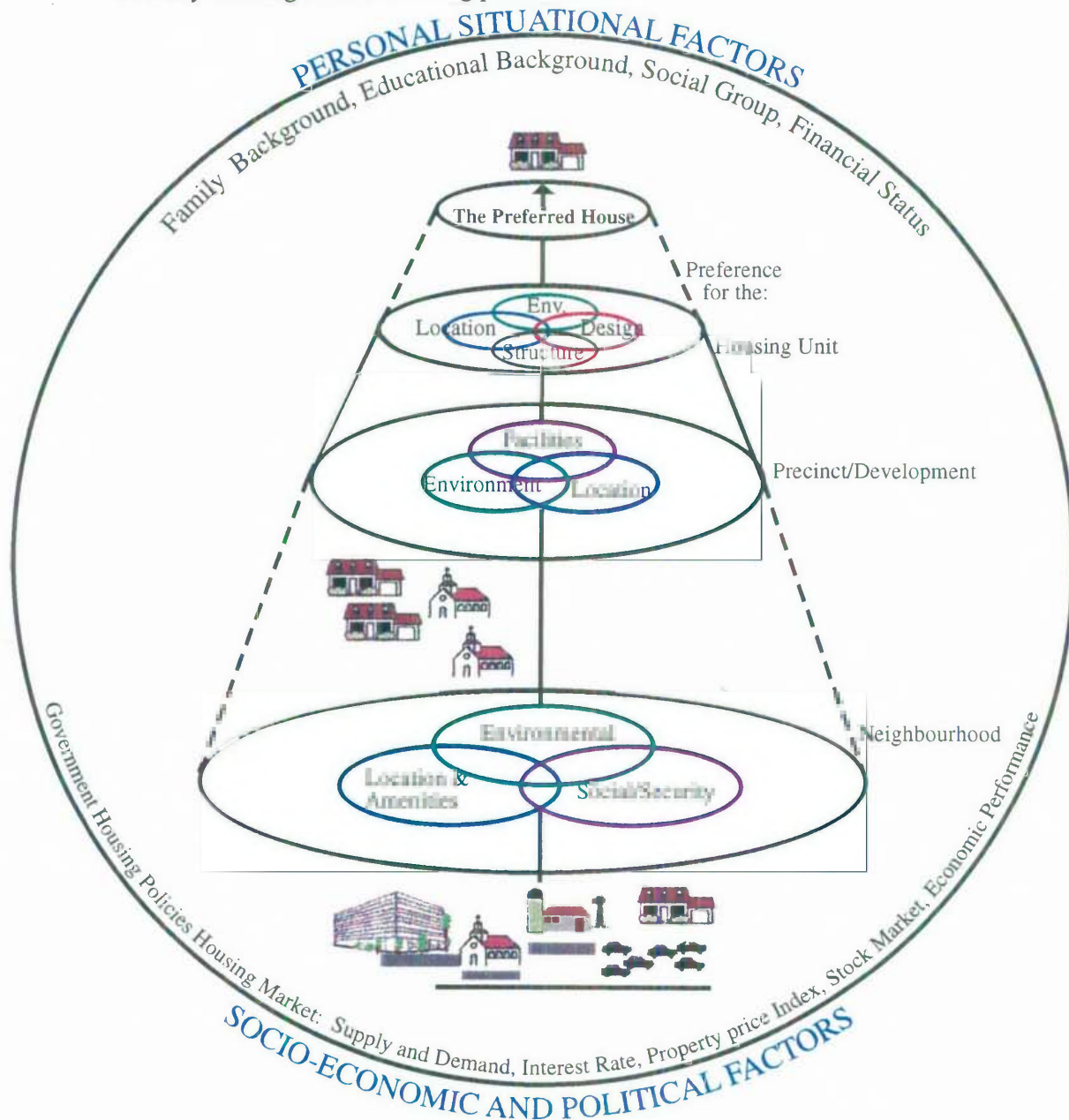
At Precinct/Development (estate) level :

- (i) Relative Location (geographic position) of the precinct/development within the area (neighbourhood)
- (ii) Environmental considerations
- (iii) Facilities within the estate

At Dwelling Unit (Block/Housing Unit) level :

- (i) Specific location of unit within the block or precinct
- (ii) Environmental Considerations
- (iii) Design Considerations
- (iv) Structural Considerations

For owner occupiers, having examined the attributes at these three levels satisfactorily, the ultimate outcome is a preferred housing unit at the top of the cone as shown in Figure 4-3. The feedback loops indicate possible adjustments on preferences and perception of alternatives by the owner-occupier and the upward arrow depicts the fact that owner occupiers have gone through all these thought processes before actually arriving at their housing preferences.



The Coni-Spherical Model of Housing Preferences

Figure 4-3 (Source : The author, 1995)

4.4 Development of Sub Models

Many individual decision making processes are sequential in nature. An excellent example is the process of choosing and buying a house, for in the search phase of this process an individual must decide whether to make a bid on the best vacancy previously discovered or whether to search further. An important feature of sequential processes is that individuals may change their beliefs concerning the environment of search (Smith and Mertz, 1980: 155).

Smith and Metz's (1980) remarks above indicate that choosing a home involves making sequential decisions. However, in this study it is posited that although the owner-occupier's preferences are made up of different preferences, the owner occupiers may consider acting on their preferences at any of the three levels, and not necessarily in a sequential manner.

The neighbourhood model in Figure 4-4 on page 75 shows three main groups of attributes affecting the owner-occupiers' preferences for a particular neighbourhood :

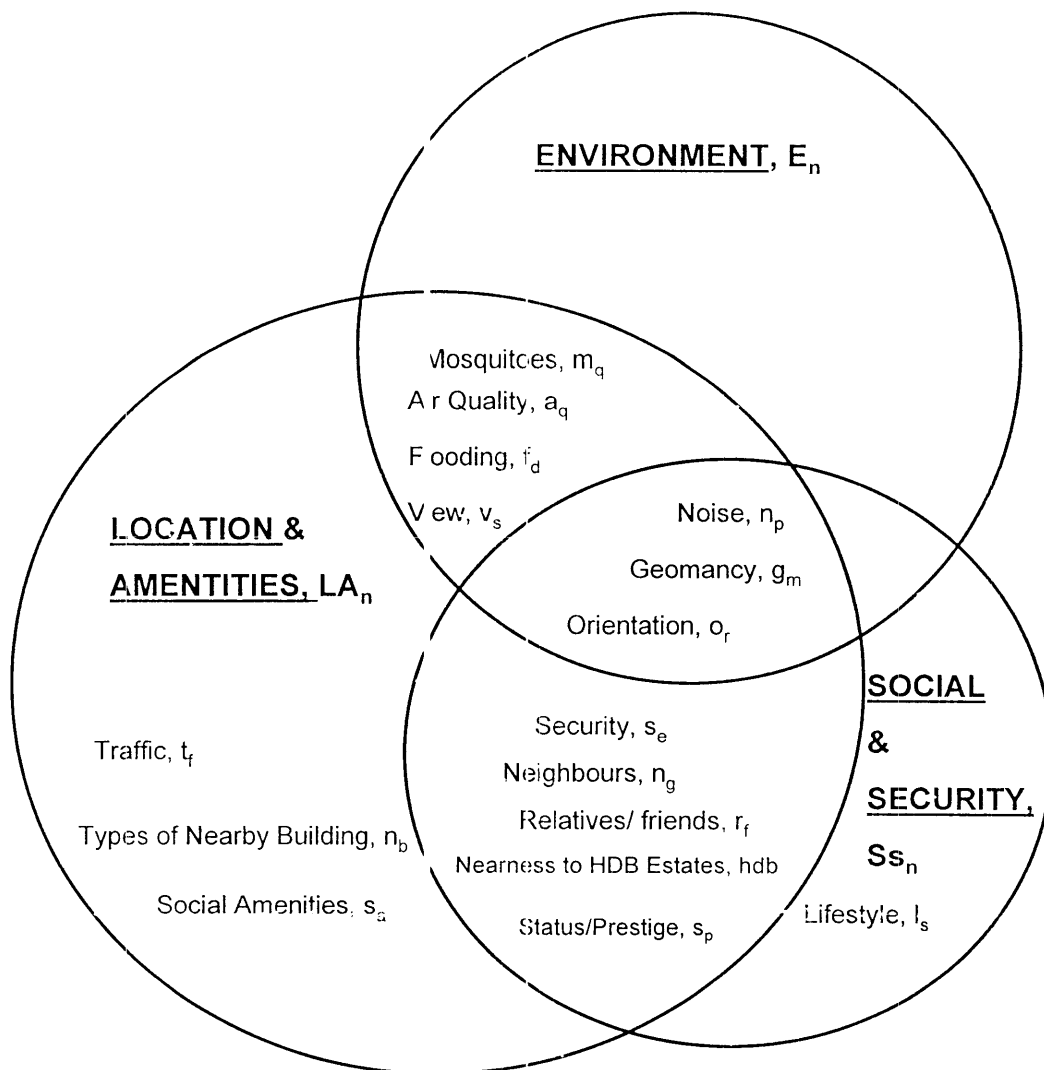
- (i) Neighbourhood Environment, E_n
- (ii) Locality and Amenities, La_n
- (iii) Social and Security, SS_n

Similarly, for the sub-model on Precinct Preferences in Figure 4-5 on page 77, the various attributes can again be arranged into three groups:

- (i) Precinct/Development Environment, E_d
- (ii) Precinct/Development Location, L_d
- (iii) Precinct/Development Facilities, F_d

In the model of housing preferences shown in Figure 4-6 on page 79, four main groups of attributes are presented:

- (i) Housing Environment, E_h
- (ii) Housing Location, L_h
- (iii) Housing Design, D_h
- (iv) Structures, S_h



The Neighbourhood Sub-Model above consists of a Venn diagram with three overlapping circles. The three circles represent three groups of attributes: Location and Amenities; Environment, and Social and Security. Some of the attributes such as prestige associated with living in a particular neighbourhood are grouped under the social as well as location considerations. Three other factors: noise, geomancy and orientation are grouped under all the three considerations as shown in the shaded portion in the Venn diagram. This is obvious, as the presence or absence of noise is dependent not only on the location of the dwelling unit, but also on the social behaviour of the residents. Geomancy and orientation are dependent on the relative position of the house (location) and on the social belief of the residents (social) as well as the wider environment. The equations on the next page, explained the interrelationship of the attributes.

Neighbourhood Sub-Model
(Neighbourhood Preferences)

Figure 4-4 (Source: The Author, 1996)

At the neighbourhood preferences level :

$$LA_n = f(E_n + (S_n - I_s - S_p) + t_f, n_b, S_a)$$

where,

- LA_n = neighbourhood Locality and Amenities
- E_n = environmental attributes at neighbourhood level
- S_n = social and security attributes
- I_s = lifestyle commonly found in the neighbourhood
- S_p = status and prestige associated with living in that neighbourhood
- t_f = traffic condition (accessibility)
- S_a = social amenities
- n_b = type of nearby buildings

$$E_n = f(n_p, a_q, f_d, v_s, m_q, g_m, o_r)$$

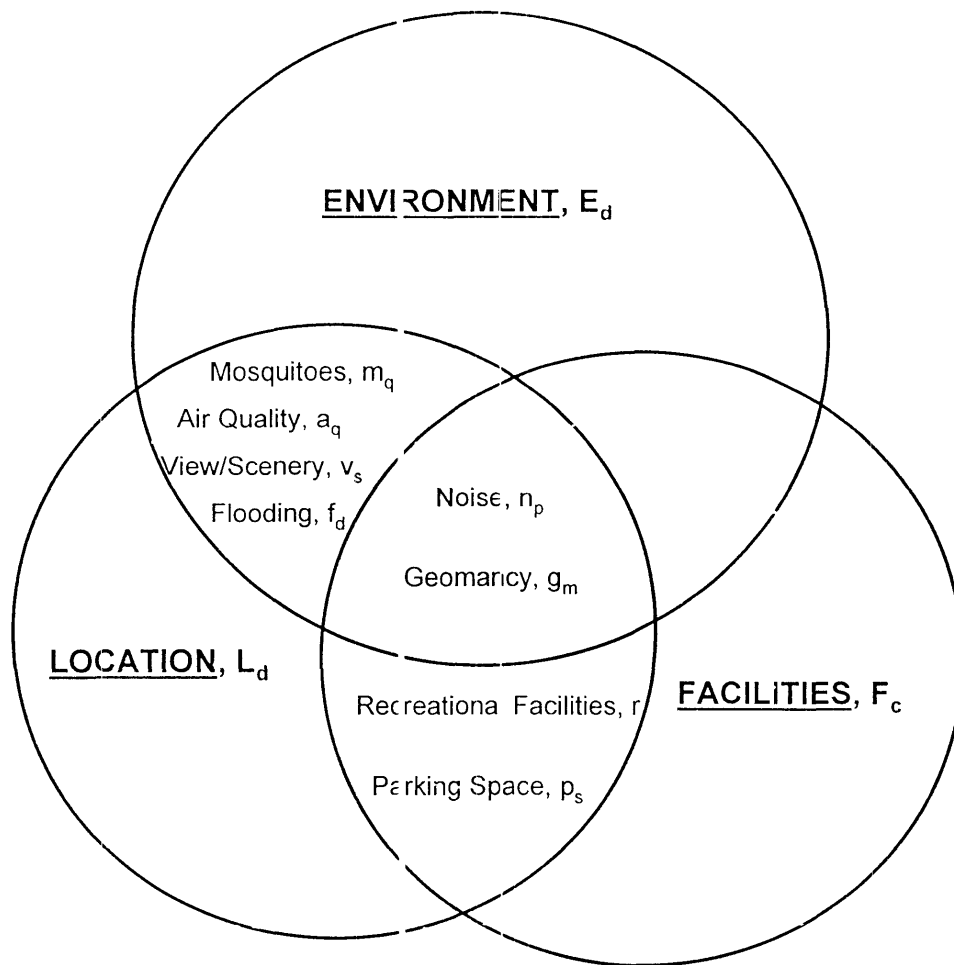
where,

- E_n = environmental attributes at neighbourhood level
- n_p = noise level
- a_q = air quality
- f_d = possibility of being a flood prone area
- v_s = visual and scenic environment
- m_q = presence/absence of mosquito
- g_m = geomancy
- o_r = orientation

$$Ss_n = f(I_s, \epsilon_p, S_e, r_f, g_m, p_v, n_g, o_r, hdb)$$

where,

- Ss_n = social and security attributes
- I_s = lifestyle commonly found in the neighbourhood
- S_p = status and prestige
- S_e = security
- r_f = relatives and friends
- g_m = geomancy or 'fengshui'
- o_r = orientation
- p_v = privacy
- n_g = neighbours
- hdb = nearness to hdb estates



The Precinct/Development Sub-Model shows the attributes related to the owner-occupiers' preference for a particular precinct or development. The model takes the form of a Venn diagram with three overlapping circles, each representing the three groups of attributes: Environment, Location and Facilities. Some of the attributes such as noise and geomancy are deemed to belong to all the three groups. For example, noise is an environmental attribute and is dependent on the location of the dwelling unit. For example, owner occupiers who live in a house which is built very near to a playground is very likely to be affected by noise made by children.

Precinct/Development Sub-Model
(Precinct/Development Preferences)

Figure 4-5 (Source: The Author)

At the precinct/development level,

$$L_d = f(E_d, F_c)$$

where

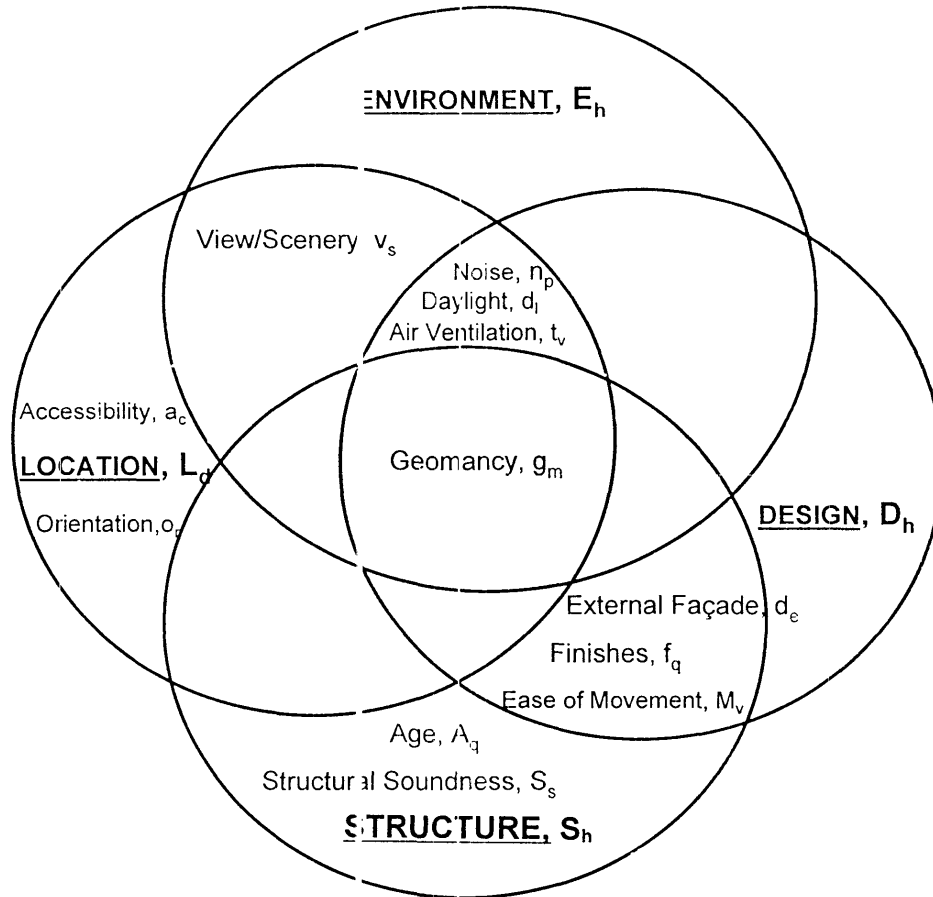
L_d = locational attributes of the precinct
 E_d = environmental attributes at precinct
 F_c = facilities available within the precinct

$$F_c = f(r, p_s, n_p, g_m)$$

r = nearness to recreational facilities
 p_s = accessibility to parking space
 g_m = geomancy or 'Feng Shui'
 n_p = noise level

$$E_d = f(n_p, m_q, f_d, v_s, a_q, g_m)$$

n_p = noise level
 m_q = presence of mosquitoes
 g_m = geomancy or 'Feng Shui'
 f_d = possibilities of flooding
 a_q = air quality
 v_s = view and scenery



The Housing Sub-Model shows the attributes related to the owner-occupiers' preference for a particular housing unit. The model takes the form of a Venn diagram with four overlapping circles each representing the four groups of attributes: Environment, Location, Structure and Design. Some of the attributes such as noise and geomancy are deemed to belong to more than one group of attributes. For example, noise is an environmental and locational attribute and is also affected by the design of the house, i.e. a house with good sound insulation windows is likely to be less affected noise from the outside.

Housing Sub-Model
(Housing Preferences)

Figure 4-6 (Source: The Author)

At the dwelling unit level,

$$L_h = f (E_h + a_c, o_r)$$

where,

L_h	=	locational attributes
E_h	=	environmental attributes
a_c	=	accessibility
o_r	=	orientation

$$E_h = f (n_p, t_v, d_l, v_s, g_m)$$

where,

E_h	=	environmental attributes
n_p	=	noise level
t_v	=	thermal comfort and ventilation
d_l	=	availability of daylight
v_s	=	view and scenery
g_m	=	geomancy or 'Feng Shui'

$$D_h = f (d_e, d_i, f_q, M_v, M_m)$$

where,

D_h	=	design attributes
d_e	=	external facade
d_i	=	internal layout design
f_q	=	quality of finishes
M_v	=	ease of movement
M_m	=	ease of maintenance

$$S_h = f (A_q, S_s)$$

where

S_h	=	structural attributes of the house,
A_q	=	age of the house
S_s	=	structural soundness of the house

The following section examines the attributes one at a time to highlight the ways they affect the preferences of the owner-occupiers.

4.4.1 Locational Attributes

The three rules of real estate investment:

1. LOCATION
2. LOCATION
3. LOCATION

(Somers,1992; Marbeck, 1994; Lee,1991)

As in the models presented above, locational attributes affect the owner occupiers' preferences for the neighbourhood, the precinct and the dwelling unit. Locational attributes are grouped according to three levels :

- (i) Locality, L_{An} (The locality the neighbourhood is in)
- (ii) Precinct/development Location, L_d , (the location of the precinct in the neighbourhood)
- (iii) Housing unit Location, L_h , (The relative position of the housing unit in the precinct)

Munro and Lamont (1985) indicated that different preferences for neighbourhood amenity and accessibility seem to interact with varying familiarity with, and knowledge of, different parts of the city to produce patterns of residential mobility and housing-market search behaviour which suggest a considerable degree of disequilibrium along geographic and structural lines.

The location of a property is paramount in determining its value (Fogel,1987). However, given advanced infra-structure and modern means of transportation, these three rules may be challenged. Pecotich and Fraser (1990) wrote that in the past, the value and desirability of residential property was considerably enhanced if it was close to public transport, preferably on a bus or tram route or within a stone's throw of a railway station. That, they insisted, was because the use of the motor-car during the

pre-World War II period was not as widespread as it is today. But, nowadays, in a pollution-conscious, more affluent and better educated society with higher aspirations, and where private transport is the norm, this imperative may no longer rank as highly or as universally as it once did in the selection process. Nor, it surprisingly seems, is location still deemed the *ne plus ultra* of real estate desirability. This is especially true in the case of Singapore, where the whole island is served by a good network of highways and roads.

Locational attributes in relation to other attributes

In addition to accessibility, locational attributes should include such considerations as the desirability of the location in terms of environment and social well being. This is clearly shown in the neighbourhood preferences sub-model (see Figure 4-4 on page 75). Environmental considerations include, among others, such factors as whether the site is in flood prone or polluted areas. Singapore has a tropical climate characterized by high temperatures and humidity. The island has no pronounced wet or dry season, but during periods of heavy rain, flooding is common in low-lying areas. As such, houses in areas that are prone to flooding are not very well received by would be home buyers. In addition to this, the inherent cause of a person's decision to prefer a particular locality is basically a social one.

Thus, in the same model, social and security attributes are location dependent. For example, the desirability of a particular location depends on how the area has been perceived by the people, i.e. whether as a high class residential area or as a slum area or as a generally peaceful area or as a crime prone area.

4.4.2 Environmental Attributes

It is widely acknowledged in the study of people-environment interaction that the acquisition of environmental information, and the use of that information in some form of decision-making process, serves as a prelude to overt or 'acted out' behaviour (Walmsley and Lewis, 1993:95).

Closely related to the locational attributes are those of the environmental attributes. In this study, environmental attributes are considered at the three levels as follows :

Area/Neighbourhood Environmental attributes, E_n

Precinct/Development Environment, L_d

Housing unit Environment E_h

The four main physical aspects of environmental attributes in housing preferences are briefly highlighted as follows:

i. Noise

Sound affects us profoundly. Very quiet places may be relaxing, or they may be troubling, depending on the individual. Noisy places are very irritating to most people. However, a certain amount of background sound is often considered "activating" and "beneficial" (Rousseau *et al.* 1988: 28). In an earlier research by the author, it was pointed out that in large cities, including Singapore, community noise level was rising. The reasons given were the increase in the density of population by people living closer together in high-rise flats, and the increase in motor vehicles and construction work. Furthermore, it was concluded that people living in big cities are becoming more and more noise-conscious (Tan, 1988). Thus, noise or the absence of it can play an extremely important part in the housing preferences of the owner occupiers. In crowded areas such as flats, the common sources of noise are those of the house radio and television sets, as well as human voices. Because of the close proximity between fairly high units, these noises can be very disturbing. In this study, consideration of noise is included in all the three sub-models.

ii. Air Quality and Ventilation

A dwelling unit exists within a space and the space inevitably contains air. Many people feel uncomfortable unless the air smells fresh and moves freely. Preference for the amount of air circulation may differ from one person to another. Some people do not like a draft, while others do not mind it. Some may have a high tolerance for odors and other pollutants in the air but some other people may have a low tolerance (Lewis, 1984). For the environmentally sensitive, carefully controlled ventilation, with air purification where necessary, is essential in their homes. In Singapore, this aspect of the environment comes under the purview of the Ministry of the Environment (ENV). The Ministry noted that ambient lead levels have been halved from 0.2 units in 1989 to 0.1 in 1993. The introduction of unleaded petrol and the tougher smoke emission standards have resulted in lower lead concentrations and other pollutants in the air (Nathan, 1993).

While direct epidemiological causal-effect relationships in the context of indoor pollutants and human beings are still to be established, the problems of "sick building syndrome" and "building related illness" are very much "real" in modern cities. However, in the opinion of the author, the air quality problem in residential settings has not reached a level that warrants serious action because most of the houses in Singapore are not using centralised air conditioning systems. This attribute is represented in all the three sub-models.

iii. Daylight

Light is the most potent force through which we experience our surroundings and is also regarded as one of the strongest poetic metaphors that we know in literature and religion. As such, this aspect of the overall environment has to be carefully studied. At home, light is also important for good physical and emotional health (Rousseau, *et al.* 1988: 9). In this study, owner occupiers' preference for lighting level is considered at the individual housing unit level as shown in Figure 4-6 on page 79.

iv. Thermal Comfort

Thermal comfort is defined as the condition of mind which expresses satisfaction with the thermal environment (ISO 7730: Moderate thermal environments - Determination of the thermal indices PMV and PPD and assessment of thermal environments for comfort).

The temperature and humidity inside a dwelling depends on environmental as well as the thermo-physical properties of the building materials. Rousseau *et al.*(1988) stressed that air temperature and humidity in homes are major factors for maintaining comfort and good health. Extreme conditions of temperature and humidity cause discomfort, promote the spread of micro-organisms which cause disease and can seriously irritate the respiratory system. High temperature and humidity also increase the level of air pollutants such as formaldehyde from building materials. The thermal comfort within a dwelling is affected by various factors.

These factors range from the orientation of the home, to the use of proper insulation, proper design and to the weather conditions and the time of the year. Homeowners will normally take this aspect of the environment into consideration, notwithstanding the availability of air-conditioning. This is because, besides the use of air-conditioning being costly, it is viewed by some as not conducive to good health. Again, this attribute is considered at the individual housing unit level as shown in Figure 4-6 on page 79.

Environmental Attributes in relation to the other attributes

The home should be a place to promote well-being, and should be designed to reduce environmental stress and should incorporate good design taking into consideration the various human needs. The traditional view of architectural design was an aesthetic, practical process must be expanded to include a more complete and holistic understanding of the links between people and the built environment (Rousseau *et al.*,1988: viii).

On the basis of a study among households affected by urban renewal in Boston, Hartman (1963) concluded that traditionally, physical factors alone have been stressed in the evaluation of housing conditions and in the planning for improved residential

areas. He pointed out that though physical factors are important, they can have no invariant or "objective" status and can only be understood in the light of meaning for our lives. Charles (1977), on the other hand suggested that the environmental attributes which are desired by buyers may vary according to social class and income (social and financial attributes).

There are also environmental attributes, E_h , specific to individual houses which will cause price differences even within a fairly homogeneous district. The house overlooking an open field (view, v and scenery, s) might have a premium, while the one overlooking the sewage works will fetch less than average (Nasar, 1983). In this study, it is stressed that physical attributes in the local social and cultural context would include such environmental and design factors as the orientation, (o), of the dwelling unit, the view from its windows, (v), its appearance, (ap), and the materials, (mt), used for its construction. In many respects these are of concern to "Feng Shui" or Chinese Geomancy, (gm), an area of increasing interest among housebuyers. In a hyperbolic sense, however, "Feng Shui" means :

... a quasi-scientific system, supposed to teach men where and how to build graves, temples and dwellings, in order that the dead, the gods and the living may be located therein exclusively, or as far as possible, under the auspicious influences of Nature (Walters,1993:13).

Jordan and Rowntree (1990: 479) defined geomancy thus :

... a traditional East Asian form of environmental perception, also called feng shui, by which particular configurations of terrain, compass directions, soil textures, and watercourse patterns become more auspicious than others, influencing the siting of houses, villages, cities, temples, and graves.

The orientation of the dwelling unit should be an integral part of its design. Correct siting on the property can make it pleasant to live in and more attractive to buyers when it is placed on the market. In short, with rising expectations, luxury living just wouldn't be complete without a breathtaking view to go with it. This is why some of the latest condominiums in Singapore come with a unique and spectacular view. Be it a panoramic city backdrop, spectacular waterfront, or lush tropical interior of the gardens, these features are gaining popularity with home seekers. Interestingly, research findings into the area of visual preferences have all pointed to the increasing

importance of the visual fields as observed by the owner occupiers (Seung, 1984; Dearden, 1980; Nasar, 1983). Nasar (1983) pointed out that people care greatly about the visual quality of the environment and this care manifests itself in various ways. He cited the case of neighbour turning against neighbour over a change in the visual character of a home or yard. This, according to Nasar (1983) is not surprising, as openness, spaciousness, or depth of scenes has been found to be related to the housing preferences of the owner occupiers in many environmental contexts.

4.4.3 Design and Structural Attributes

Today's home-engineering technology can fulfill a dream of domestic comfort that the greatest builders of the past could hardly imagine. On the other hand, some modern contractors may be more willing to use lesser-quality materials and to take unsound shortcuts with their work than were their Victorian counterparts. The point is that you have to make judgments about the soundness on a house-by-house basis (Vila, 1990:66).

In this study, design and structural attributes are included in the final sub model on housing preferences. This is because such attributes are more closely related to the housing unit in question than to the neighbourhood or the development as a whole. Nevertheless, design consideration may still be important when one is considering the precinct or development. For reasons of simplicity, design and structural attributes are included in the final sub model. These attributes are depicted in the following equations and include the external design and internal layout of a dwelling unit, the quality of finishes, the ease of movement and maintenance, and the structural soundness as well as the age of the dwelling unit.

One area of concern to owner occupiers in Singapore is the risk of a landslide affecting their dwelling unit. The Building Control Division (BCD) has assured the public that design and construction of buildings have taken into account the site conditions to ensure the stability of the buildings. When home buyers look at the

residential properties on the market, they are shopping by comparison. So an older, poorly maintained, or poorly designed house will not be as appealing as a newer one (Thomsett, 1989). The design, and especially the structural soundness of a dwelling unit, are of utmost importance to owner occupiers. Similarly, construction details should be rigidly specified by building codes to ensure that the structural requirements are strictly followed (Ventolo and Williams, 1992). This aspect of housing has recently been of much concern to owner occupiers in both Singapore and Malaysia following the collapse of a hotel in Singapore in 1989 and a hillside condominium in Kuala Lumpur, Malaysia on 11th December 1993. In the latter case, 51 people were killed with the resulting outcome being a fall in price of all hillside residential developments across the whole nation (Marbeck, 1994).

In Singapore, the Building Control Act of 1989 was introduced to further safeguard the structural stability of residential development. Obviously, this followed the collapse of the Hotel New World in 1989. The Act requires accredited engineers to countercheck architectural plans which must be approved by the BCD before construction can begin. Once the projects are completed, the BCD checks buildings regularly to ensure that they are maintained properly and are safe to live in. Lawrence (1987) noted that houses in the same society have quite different shapes and sizes and are built with a range of construction materials, suggesting that beyond pragmatic parameters, other factors are of at least equal importance in determining their design. This aspect of housing is related to the specific housing unit and is represented in the housing sub-model as shown in Figure 4-6 on page 79.

4.4.4 Social and Security Attributes

'The home is an important symbol to the world of ourselves and our social position.

The National Housing Strategy,
Australia. 1991.

The design of flats should encourage more social-interaction inside the common service areas in order to avoid any dead zones and hence, to avoid places in which crime, vandalism and accidents might occur (Mohd, Quazi *et al.*, 1995).

Hempel, *et al.*(1979) stressed that social status plays an important part in the way owner occupiers choose their habitats, and Lewis (1984), reinforced this view by showing that the owner occupiers would adapt their housing to match their lifestyle. She posited that the well-being of owner occupiers is affected by the micro-environment, in the form of housing. In her view, though housing can give one prestige as it can help one to show that one's status in society is high, care should be taken not to make too many assumptions based on the appearance of the housing of others. She argued logically that one may get the wrong impression since values are subjective. In other words, something that one group views as giving them prestige may seem very insignificant to others.

Past researchers working on the social choice hypotheses proposed that patterns of socio-economic residential dispersion resulted from differences in group values, needs, and aspirations (Duncan and Duncan, 1960 and Laumann, 1966). Preference factors for locational decisions evolving from these hypotheses basically concern the desire to reside close to prestigious or interpersonally compatible households or relatives. A similar phenomenon exists in Singapore, where landed houses and condominiums in well regarded prime districts of 10 and 15 can command premium prices compared to similar properties in not so popular areas or districts. In the neighbourhood preferences model, social and security attributes are grouped together. This is because both groups of attributes are closely related and inevitably involve considerations for the socio-economic characteristics of neighbourhood (see Figure 4-4 on page 75).

Social and Security Attributes in relation to the other attributes

In many ways, social and security attributes are related to environmental and locational attributes. Indeed, the manner in which owner occupiers perceive all the attributes discussed above depends very much on personal as well as socio-economic and political factors. For example, the location of a house will determine its social standing among other houses in a given neighbourhood. Of course, this neighbourhood may or may not be a prestigious one. Similarly, the physical environment in which the house stands will affect its level of security. For example, a house that is in a secluded part of an estate is deemed more likely to be broken into than one in a brightly lit part of the same estate. Besides security, there is also the question of personal safety. Using regression analysis, Weldemann *et al.*(1982) presented results regarding the overall strength of the relationship between various factors and residents' safety. The most important factors were the concern for where children were allowed to play, suspicion of strangers and noise. These concepts seem to indicate an awareness on the part of the residents of the security and safety aspects of their living environment. In this study, social and security attributes are being considered in the neighbourhood preferences sub-model.

With the models in place, the next section touches on derivation of hypotheses on housing preferences.

4.5 DERIVATION OF HYPOTHESES

This section describes the derivation of hypotheses on housing preferences. An hypothesis has been regarded in most textbooks on research methodology as a testable prediction. As for hypothesis testing, it is often thought of as the use of inferential statistics to determine whether the relationship found between two or more variables in a particular sample holds true in the population, or whether the observed relationship is due to sampling error (Mitchell and Jolley, 1989). The derivation of hypotheses in this study has its beginnings in the initial ideas formed on housing preferences. These ideas are carefully refined into possible perceptions of owner-occupiers' residential preferences at three different levels. Subsequently, the attributes involved at all three levels were converted into research hypotheses as presented below. In other words, the attributes involved in housing preferences are operationalised into specific procedures for measurement or manipulation.

Such procedures, according to Graziano and Raulin (1989), are referred to as operational definitions of the concept. The overall process of the derivation of hypotheses follows the recommendation of Graziano and Raulin (1989) and is shown in Figure 4-7 on page 92.

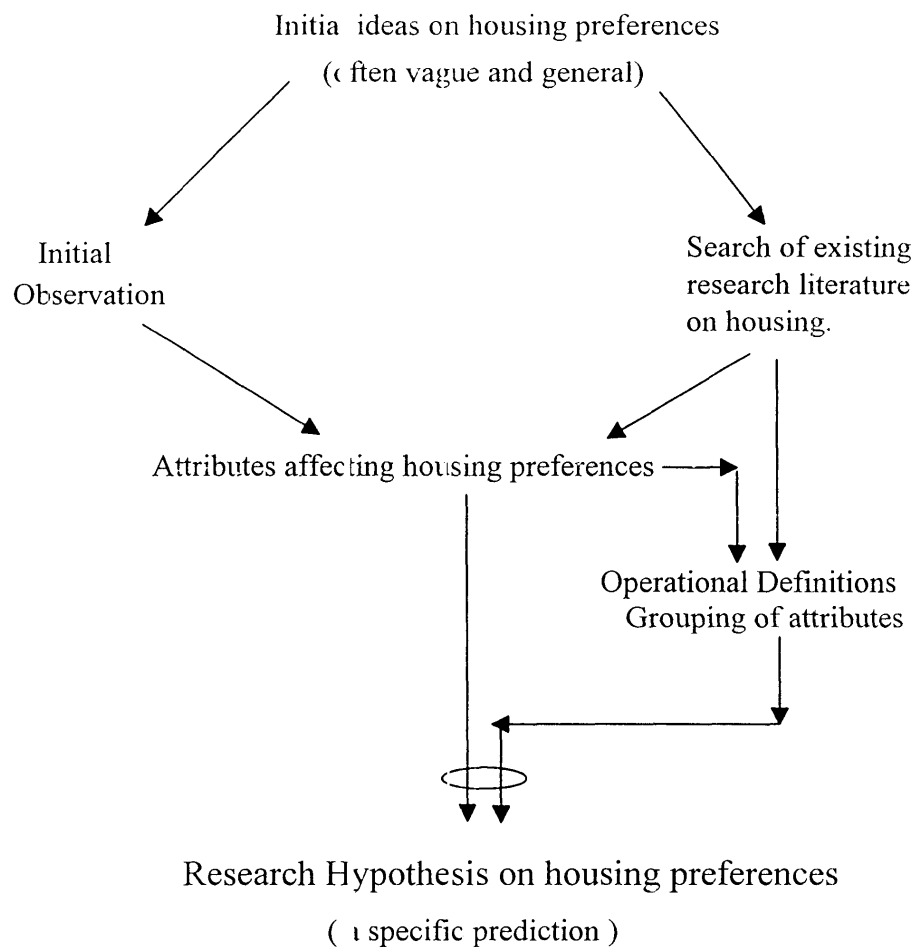


Figure 4-7
 A Model of the Development of Hypotheses on Housing Preferences.
 [Adapted from Graziano and Raulin (1989)]

It is common in research of this nature to test the null hypotheses of no association or no correlation, even though the main aim is to find a significant association or correlation to yield useful implication (Burns and Bush, 1995; Zikmund, 1988; Wong, 1993). The null hypotheses are tabulated in Tables 4-2 to 4-5.

Table 4-2
Hypotheses (Social, Security, Financial)

s/no	Attributes	Null Hypotheses		Remarks	
		There is no significant relationship between:	and	vs	
10.2	Social	the importance placed on the status/prestige of the dwelling unit	the income group of the owner occupiers.	Prestige	Income group
			the age group of the owner occupiers.	Prestige	Age group
			the two categories of owner occupiers.	Prestige	Type of dwelling occupied
10.3	Social	the importance placed on trend and fashion of living in the dwelling unit	the age group of the owner occupiers.	Trend and Fashion	Age group
			the two categories of owner occupiers.	Trend and Fashion	Type of dwelling occupied
10.4	Social	the importance placed on lifestyle of living in their dwelling unit	the age group of the owner occupiers.	Lifestyle	Age group
			the two categories of owner occupiers	Lifestyle	Type of dwelling occupied
10.6	Social	the importance placed on being able to get along well with neighbours	the age group of the owner occupiers.	Neighbour	Age group
			the two categories of owner occupiers.		Type of dwelling occupied
			profession of the owner occupiers.		Profession
10.7	Social	the importance placed on their houses being close to close relatives	the age group of the owner occupiers.	Close Relatives	Age group
			number of children in the household.		Number of children
10.11	Social	the importance placed on the traffic conditions near their dwelling unit	the number of cars in the household.	traffic conditions	Number of cars in the household.
10.27	Social	the importance placed on privacy	the two categories of owner occupiers.	Privacy	Type of dwelling occupied
10.5	Security	the importance placed on security of living in their dwelling unit	the age group of the owner occupiers.	Security	Age group
			the two categories of owner occupiers.	Security	Type of dwelling occupied
			number of children the owner occupiers have	Security	nos. of children
10.29	Financial	the importance placed on rental values of the dwelling unit	the two categories of owner occupiers.	Rental values	type of dwelling occupied
10.30	Financial	the importance placed on price of the dwelling unit	the profession of the owner occupiers.	Price	Profession

Note:

The two categories of owner occupiers are: Landed Housing and Condominium/Apartment.

Table 4-3
Hypotheses (Environmental)

s/no	Attributes	Null Hypotheses		Remarks	
		There is no significant relationship between :	and	Vs	
10.8	Environment	the importance placed on views and scenery	the two categories of owner occupiers.	View and Scenery	Type of dwelling occupied
			the age group of the owner occupiers.		Age group
10.9	Environment	the importance placed on the types of nearby buildings	the two categories of owner occupiers.	Nearby buildings	Type of dwelling occupied
			the age group of the owner occupier.		Age group
10.10	Environment	the importance placed on the nearness of their dwelling unit to HDB estates	the two categories of owner occupiers.	HDB estates	Type of dwelling occupied
10.12	Environment	the importance placed on air quality	the two categories of owner occupiers.	Air Quality	Type of dwelling occupied
			the floor level at which the owner occupiers live.		Floor level
10.13	Environment	the importance placed on noise	the two categories of owner occupiers.	Noise	Type of dwelling occupied
			the floor level at which the owner occupiers live		Floor level
10.14	Environment	the importance placed on daylight	the two categories of owner occupiers.	Daylight	Type of dwelling occupied
10.15	Environment	the importance placed on ventilation	the two categories of owner occupiers.	Ventilation	Type of dwelling occupied
			the floor level at which the owner occupiers live		Floor level
10.16	Environment	the importance placed on orientation	the two categories of owner occupiers.	Orientation	Type of dwelling occupied
			the age group of the owner occupiers.		Age group
			the gender of owner occupiers.		Sex
10.17	Environment	the importance placed on geomancy	the two categories of owner occupiers.	Geomancy	Type of dwelling occupied
			the age group of the owner occupiers.		Age group
			the occupation of owner occupiers.		Occupation

Note:

The two categories of owner occupiers are: Landed Housing and Condominium/Apartment.

Table 4-4
Hypotheses : (Location, Design, Facilities)

s/no	Attributes	Null Hypotheses		Remarks	
		There is no significant relationship between:	and	Vs	
10.18	Location	the importance placed on flooding	the two categories of owner occupiers.	Flooding	Type of dwelling occupied
10.19	Location	the importance placed on the presence of Aedes mosquitoes	the two categories of owner occupiers.	Aedes Mosquitoes	Type of dwelling occupied
10.20	Design	the importance placed on internal layout of the dwelling unit	the two categories of owner occupiers.	Internal Layout	Type of dwelling occupied
10.21	Design	the importance placed on the quality of finishes of the dwelling unit	the two categories of owner occupiers.	Quality of finishes	Type of dwelling occupied
10.22	Design	the importance placed on the external facade/appearance/design of the dwelling unit	the two categories of owner occupiers.	External Facade/appearance/design	Type of dwelling occupied
10.23	Design	the importance placed on ease of movement	the two categories of owner occupiers.	Ease of movement	Type of dwelling occupied
10.24	Design	the importance placed on ease of maintenance	the two categories of owner occupiers.	Ease of maintenance	Type of dwelling occupied
10.1	Facilities	the importance placed on nearness of the dwelling unit to recreational facilities	the two categories of owner occupiers.	Recreational Facilities	Type of dwelling occupied
			the age of owner occupiers.	Recreational Facilities	Age group
			the numbers of children in the household.	Recreational Facilities	Numbers of children
10.25	Facilities	the importance placed on parking space	the two categories of owner occupiers.	Parking Space	Type of dwelling occupied
			the number of cars in the household.		Numbers of cars in the household.
10.26	Structure	the importance placed on structural consideration of the dwelling unit	the two categories of owner occupiers.	Structural consideration	Type of dwelling occupied
10.28	Structure	the importance placed on the age of the dwelling unit	the two categories of owner occupiers.	Age of the dwelling unit	Type of dwelling occupied

Note:

The two categories of owner occupiers are: Landed Housing and Condominium/Apartment.

Table 4-5

Hypotheses : Neighbourhood/Housing Satisfaction and Personal Situation Factors

Ref.	Null Hypothesis		Remarks	
	There is no correlation between:		vs	
Q2	Neighbourhood satisfaction	type of dwelling occupied.	Neighbourhood satisfaction	Type of dwelling occupied
Q18		the age group of the owner occupiers.		Age group.
Q19		the marital status of the owner occupiers.		Marital status
Q17		the sex of the owner occupiers.		Sex
Q20a		the type of employment of the owner occupiers.		Employment
Q23		the categories of owner occupiers, i.e. whether they are living in landed properties or condominiums.		Places of employment of family members
Q26		the income group of the owner occupiers.		Income group
Q2	Housing satisfaction	the categories of owner occupiers, i.e. whether they are living in landed properties or condominiums.	Housing satisfaction	Type of dwelling occupied
Q18		the age group of the owner occupiers.		Age group
Q19		the marital status of the owner occupiers.		Marital status
Q17		the sex of the owner occupiers.		Sex
Q20a		the type of employment of the owner occupiers.		Employment
Q23		the places of employment of family members of the owner occupiers.		Places of employment of family members
Q26		the income group of the owner occupiers.		Income group

Note:

The two categories of owner occupiers are: Landed Housing and Condominium/Apartment.

4.6 Concluding Comments

This chapter provides the conceptual and descriptive models on which detailed examination into housing preferences of owner occupiers is carried out in later chapters. It also discusses the various attributes involved in the examination of housing preferences of owner occupiers. In this process, the attributes are grouped into locational, environmental, social and security, as well as design and structure in the conceptual models. These attributes are considered at three different levels of housing preferences. With the ground work in place, the chapter proceeds to present the hypotheses for testing. Owing to the large number of hypotheses involved, they are tabulated for ease of analysis and examination. This aspect of the study is discussed in Chapter Six. The next chapter discusses data collection.

Chapter Five

HOUSEHOLD SURVEY AND DATA COLLECTION

5.1 Introduction

We live in a fantasy world, a world of illusion. The great task in life is to find reality.

(The Times, 15 Apr. 1983)

This chapter describes the collection of data on housing preferences and other related issues. It categorically defines primary and secondary data sources and discusses how these data are analyzed to achieve the study's objectives. It outlines in particular, the planning and execution of a survey to obtain primary data. It also discusses the compilation of secondary data for use in conjunction with the primary data. This active phase of the research process is a component of the research plan as described in Chapter One. The principal focus of this chapter is the household survey. Since the survey is crucial to the whole thesis, the capabilities as well as the limitations of primary data collection techniques are carefully examined.

5.2 The household survey

Primary data refer to those which are collected to meet the specific research needs at hand (Wong,1993:126).

This study requires attitudinal and behavioural data that indicate the housing preferences of owner-occupiers. One obvious way to obtain such information is by conducting a household survey on housing preferences. To further reinforce the survey findings, interviews with real estate professionals, planners, local housing authorities and economists, as well as sociologists, were carried out during the initial periods of the study. This initial work contributed to the final design of the survey and was an indispensable part of the whole research work. The attitudinal data reflect each respondent's feelings about their current housing situation and their preferences

for better housing. Developers are interested in such data, as they look upon owner-occupiers' attitudes as a forerunner of house buyers' behaviour and preferences. Such data are also useful for developing planning strategies to meet the changing demands of house buyers. Behavioural data based on past housing careers of the owner-occupiers are obtained by asking questions that usually begin with what, how much, when and who. Anderson and Pooles (1994) have argued that such data, though based on past behaviour serve as an indicator in predicting future behaviour. Other sources of information used in this thesis include accounts of experimentation and investigation, as in articles in professional journals, masters and doctoral theses, and governmental reports.

5.2.1 Justifications for conducting the survey

The problem of social change is a particularly difficult one. People are not static either in their ideas or style of living (Gardner, 1978: 5).

The use of surveys is considered by researchers to be a very valuable method of measuring social change. Survey methods have long been used to discover the housing needs of such special groups as old people and the disabled (Hole and Allen, 1962, 1964; Sainsbury, 1970; Kondig, 1984; Doyle, 1990; Gibbs and Kemp, 1993, and Yoo, 1994). Yoo (1994), for one, reported that contrary to the assumption of intergenerational family living prevalent in the gerontological literature, survey data show that Korean American aged in the United States exhibit a tendency to live apart from their adult children. This tendency, he found, has been particularly noticeable during the last decade. With the data from the survey he went on to identify the factors associated with separate living arrangements and to elicit the reasons Korean American aged give for this residence pattern. Earlier, Sainsbury (1970) carried out intensive interviews with the disabled, investigating their problems with respect to finance and employment as well as housing. Much earlier in the 1960s, surveys had also been used to assess the quality of such new housing as high-rise flats (Glass *et al.*, 1964). Gardner (1978) maintained that social change is reflected in the changing attitudes of people, and changes in their likes and dislikes. Where people live, and the

kinds of houses they live in now, may not be their ideal. He maintained that, given the opportunity, they might prefer something else. He reiterated that social surveys if used properly, can effectively identify such social needs as people's wants and preferences. In addition, from the outcomes of the surveys, social planners can see to what extent their own thinking needs to be modified and to what extent they need to inform the public regarding what could be possible. Surveys thus reveal alternative lifestyles of which the public and the government are yet unaware, or are sceptical about. It is therefore justifiable for surveys to be carried out in this study to gauge the housing preferences of owner-occupiers.

5.2.2 Objectives of the Survey

The survey was carried out for a number of different but nevertheless overlapping objectives. These may be summarized as follows:

Descriptive:

- (i) to describe the housing satisfaction of owner-occupiers of private housing estates
- (ii) to identify aspects of community life and the housing environment where changes seem likely. These include households changing residential preferences that are likely to impact especially on housing quality, location preferences, environmental management, and urban development.

One of the consequences of these behavioural changes might be the eventual upgrading of accommodation from public to private housing.

Explanatory:

- (iii) to analyze relationships so as to explain the observations made in (i) and (ii) above
- (iv) to have a better understanding of the various aspects of private housing, for example, population movements i.e. drift from public housing to private housing and other social changes
- (v) to identify the causes of such changes

Predictive:

- (vi) to anticipate future housing preferences of owner-occupiers

Evaluative :

- (vii) to evaluate the results of present and past housing policies

5.2.3 The Planning of the Household Survey

In conducting any meaningful survey, it is essential to work according to a well thought out plan. Bearing in mind that the survey in this research is principally about people, i.e. who they are, how they live, what they do and more importantly what they think about their houses, the planning involved had to take into consideration the human factor (Gardner,1978:17). Accordingly, the survey was conducted only after a long period of preliminary exploration and discussion with staff members of the Department of Geography and Planning as well as other professionals involved in the housing and property industry. Briefly, the preliminary steps taken before making the overall final plan for the survey were as follows :

(i) Derivation of the research hypotheses on housing preference.

A null hypothesis is a statement about a status quo. It is a conservative statement which communicates the notion that any change from what has been thought to be true or observed in the past will be due entirely to random error. In fact, the true purpose of setting up the null hypothesis is to provide an opportunity to nullify it (Zikmund, 1988: 468).

Naturally, prior to conducting the survey, it was crucial to have a set of testable hypotheses to work on. In this study, the hypotheses were carefully stated in a null form i.e. Null Hypotheses. Again, these were derived after reference to existing literature on housing as well as informative discussions with the candidate's supervisor, fellow postgraduate students and the professionals in the local housing market. These null hypotheses as presented in the previous chapter served as the basis for the household survey.

(ii) Exploratory pilot study

Much, but certainly not all, exploratory research analysis is qualitative. Usually, exploratory research provides greater understanding of a concept or crystallises a problem, rather than providing precise measurement or quantification (Zikmund, 1988: 72).

Pilot studies collect data from the ultimate subject of the research project to serve as a guide for the larger study. When the term "pilot study" is used within the context of exploratory research, the data collection methods are informal and the findings may lack precision. Nevertheless, the results of such studies were used to suggest possible topics for formal investigation (Zikmund, 1988:39).

An exploratory pilot study was conducted in March 1993 to investigate how the respondents see the issue contained in the hypotheses and the various aspects of housing that were important to them. In all, twenty respondents consisting of fellow colleagues and friends of the candidate were involved in this pilot survey. The questionnaires were given to those who resided in private housing in the Western region of Singapore (see Figure 5-4 on page 122). The purpose of doing the pilot survey was explained to them and they were asked to respond to the questions in the pilot survey and to offer suggestions for improvement. Almost all respondents were satisfied with the way the questionnaire was drafted, except that a third of them considered the questionnaire to be slightly lengthy. Notwithstanding this, very minor changes were made to the final draft of the questionnaire and these involved rephrasing certain questions to make them shorter. Also, attributes relating to the respondents' preferences for social amenities and facilities were added. As pointed out by Zikmund (1988), rather than providing precise quantification, pilot studies are in fact carried out to provide background information for the formal survey, so no statistical analysis was carried out at this stage.

(iii) Selection of specific objectives

The selection of specific objectives was based on research hypotheses as well as the exploratory pilot study mentioned above (Wong, 1993). At this stage, the type of respondents and the conditions under which the survey was to be conducted were decided. Districts 5 and 21, being in the western part of Singapore, were selected for this study as they were near to the Jurong industrial estate and were not considered as

prime districts until very recently. However, owing to limited supply of land for residential development in the nearby prime districts of 10 and 11, the selected districts were fast becoming favourable districts for the middle and upper middle population, especially the young urban professionals upgrading from public housing. These districts therefore served as very relevant data collection pools for this survey.

As is usual survey practice, it was stressed that the survey was to be carried out in a very courteous way and on a strictly voluntary basis. No respondent would be pressured to answer any question. The types and nature of specific questions were also finalised and grouped accordingly as discussed below.

(iv) Design of Questionnaire

Questionnaires were considered a good method of primary data collection as the subjects concerned were mostly literate in either English or Mandarin (at 91.1 per cent literacy rate as of 1992) (Department of Statistics, Year Book of Statistics, 1992 Singapore). Questionnaire design involved considerable preliminary work on planning, consulting and deciding exactly what needed to be done. Much care had taken in selecting the question type, in question writing, in the design, piloting, distribution and return of questionnaires (Wong,1993; Zikmund,1988; Burns and Bush, 1995). A final questionnaire was produced after much discussion, consultation and initial testing both at the University of New England and in Singapore.

The questionnaire adopted in this study serves five key functions. First, it translates the research objective into specific questions that are asked of the respondents. Second, it standardizes those questions and the response categories so every respondent responds to identical stimuli. Third, by its wordings, question flow, and by its appearance, it fosters cooperation. Fourth, questionnaires serve as permanent records of this study. Fifth, they provide the primary data for analysis and reliability assessments (Burns and Bush,1995:289).

The questionnaire begins with an *initial statement* explaining the reasons for the conduct of the survey and a *brief instruction* to the respondents on how to complete it. Respondents were also assured that the information given by them was to be used solely for academic purposes and that participation was entirely voluntarily. A Mandarin version of the questionnaire was also prepared for the benefit of Chinese speaking respondents. Furthermore, diagrams of the different housing forms were included in the questionnaire for their reference. Basically, the questionnaire consisted of twenty seven *main questions*, with certain questions carrying a number of *sub-questions* (see Appendix 1). These questions took the form of:

Open Ended questions

Open-ended questions (Questions 7a, 7b, 9a and 9b) were intended for exploratory study to permit greater freedom of expression. In addition, these questions encourage a richness and depth in answering which is essential in research of this nature. These questions normally asked respondents to verbalize their replies without structured guidelines. The questions asked in the survey were thus more of a constrained open ended type of questions as the respondents were given freedom of choice within limits that were essentially defined.

Likert Summated Scale questions

The scale developed by Likert is based on summated ratings. A list or series of considerations i.e. from '*Extremely Important*' to '*Not important at all*' and finally ending in '*Don't know/not considered*' was used in the questionnaire for respondents to indicate the degree of importance they place for each item listed in the question. The Likert Scale uses simple responses that respondents find easy to understand, and is well suited for data collection of this nature (Wong,1993: 265). Numeric values (or codes) were assigned to each response category during the data analysis phase.

Ranking Questions

This question required the respondents to rank 6 forms of investment in order of their preferences. Only question 16 employs this method and respondents were asked to input 1 for the most preferred form of investment and 6 for the least.

The questionnaire was made up of five groups of questions in the order given as follows:

(a) Questions concerning the details of the present house

These questions asked about the present house occupied by the respondent. Information obtained was needed to gauge the housing preferences and satisfaction levels of owner-occupiers of different housing types. Examples of such questions include :

Q2: The type of housing, Q4: Floor area and Q5: The type of tenure etc..

(b) Questions concerning the neighbourhood environment the respondents live in

Examples of these questions are :

Q7 : What are the Three (3) things you best like about living in this neighbourhood? (Open-Ended Question).

Question no.8 employs a *Likert Summated Scale* for respondents to consider the importance they place on the various environmental factors affecting their neighbourhood, for example:

Q8 : Living in your present neighbourhood, please assess the importance of the following :

- 8.1 Nearness to shopping centres/shops
- 8.2 Nearness to wet market

Respondents are requested to tick one of six response categories ranging from *Extremely Important* to *Not Important at All* or *Don't Know/Not Considered*.

(c) Questions concerning the housing environment in which the respondents live in

As in [b] above, both *open ended questions* as well as the *summated scale* are employed. For example, the *open ended Question 9*, asks:

What are the THREE (3) things which you best like about living in this house?

Question no.10, the *Summated Scale question* lists a total of 31 environment-related sub questions for respondents' selection. All these sub questions concern the house they live d in.

(d) Questions concerning the investment preferences of the respondents

This part of the questionnaire was concerned with the Investment Portfolio of the respondents. Question no.16 for example, requires the respondent to rank the various form of investment in order of personal preference.

(e) Questions concerning something about the respondents themselves

The last part of the questionnaire asked about the respondents themselves. These include questions on sex, age, employment status and salaries of the respondents. These classification questions were intentionally kept towards the end of the questionnaire. To avoid irritating the respondent, certain questions such as the one asking about annual income were described as optional.

5.2.4 Choice of methods

Several methodological decisions were made and these include:

- (i) The survey was conducted using self-administered questionnaires. Questionnaires were handed to a random sample of house owners who were briefed on the purpose of the survey and were asked to return the duly completed form in a stamped self-addressed envelope, allowing the respondents to take their time to answer the questions in the questionnaire. When respondents required assistance in answering the questions, the surveyors were always ready to assist.
- (ii) The questions were to be answered only by the legal owner of the house. In the case of joint ownership, the respondent was permitted to confer with the other joint owner before giving answers to each question. This ensured that the questionnaire was being answered jointly by all the owners rather than by an individual person.
- (iii) A glossary of terms was included in the questionnaires to enable the respondents to understand them better.
- (iv) District Selection
Only District 5 (see Figure 5-6 on page 124) and District 21 (see Figure 5-5 on page 123) in the Western Region (see Figure 5-4 on page 122) of the island were selected for the study for reasons as given in chapter one.
- (v) Software Selection
The Statistical Package for Social Sciences, SPSS Version 5.0 for Windows was selected as the main software programme for the analysis of the data. Statistical analyses were carried out using Chi Square and other relevant techniques.

(vi) Selection and training of Surveyors

In selecting personnel for conducting the survey, considerations were given to the following criteria:

- (a) the interviewer must preferably be bilingual in English and Mandarin as most if not all households in Singapore speak at least one of the two languages.
- (b) female interviewers are generally preferred as most households are suspicious of males knocking at their doors. This is because in Singapore, house burglaries have been conducted by males knocking on the doors of unsuspecting house owners.

The selected personnel were trained to conduct the survey in a proper manner, with emphasis being put in particular on courteous ways to approach the households. An initial briefing lasting about three hours was given to the selected surveyors. Topics covered included:

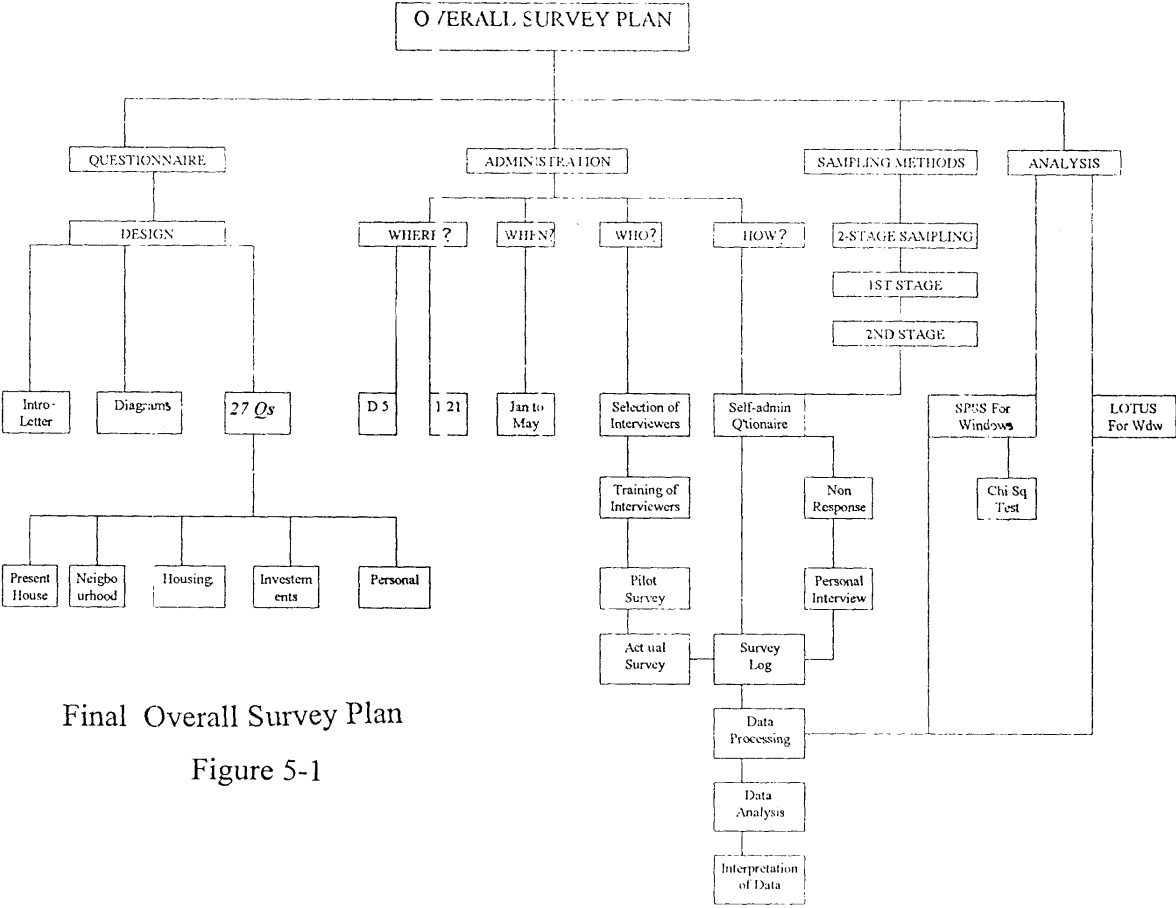
- (a) the operation of the property market of Singapore
- (b) Terms and definitions related to real estate and other legal and technical terms used commonly in the housing market
- (c) Survey methodology and technique

This was followed by another session of 'on the job' field training. During this session, the surveyors were shown the way to approach the households and to explain the rationale of the exercise to them. In households where no one was in, the questionnaires were left in their letter boxes and record kept as to the total number of questionnaires sent out on a particular day.

From the above considerations, two groups of Singapore Polytechnic Building and Property Management female final year students were selected to conduct the surveys. Each group consisted of three students. The pilot exploratory survey was conducted in March 1993 and the actual field survey was carried out over a 3 months period from April 1993 to June 1993.

5.2.5 FINAL (OVERALL PLAN) FOR THE SURVEY

The Final or Overall Plan for conducting the Survey was then implemented and this was mainly done by estimating the time required for each step and the likely expenses to be incurred. The costs include printing the questionnaires; postage and stationery; research assistants/surveyors fees; traveling expenses; computer services and data entry clerical services. The final overall survey plan is shown in schematically in Figure 5-1



Final Overall Survey Plan
Figure 5-1

5.3 Sampling Method

This study employed random sampling procedures: specifically the multistage sampling concept as explained by Foreman (Foreman, 1991). A 2-stage sampling method was used and simple random sampling was then employed at each stage to eventually arrive at the required sample sizes (see Figure 5-2).

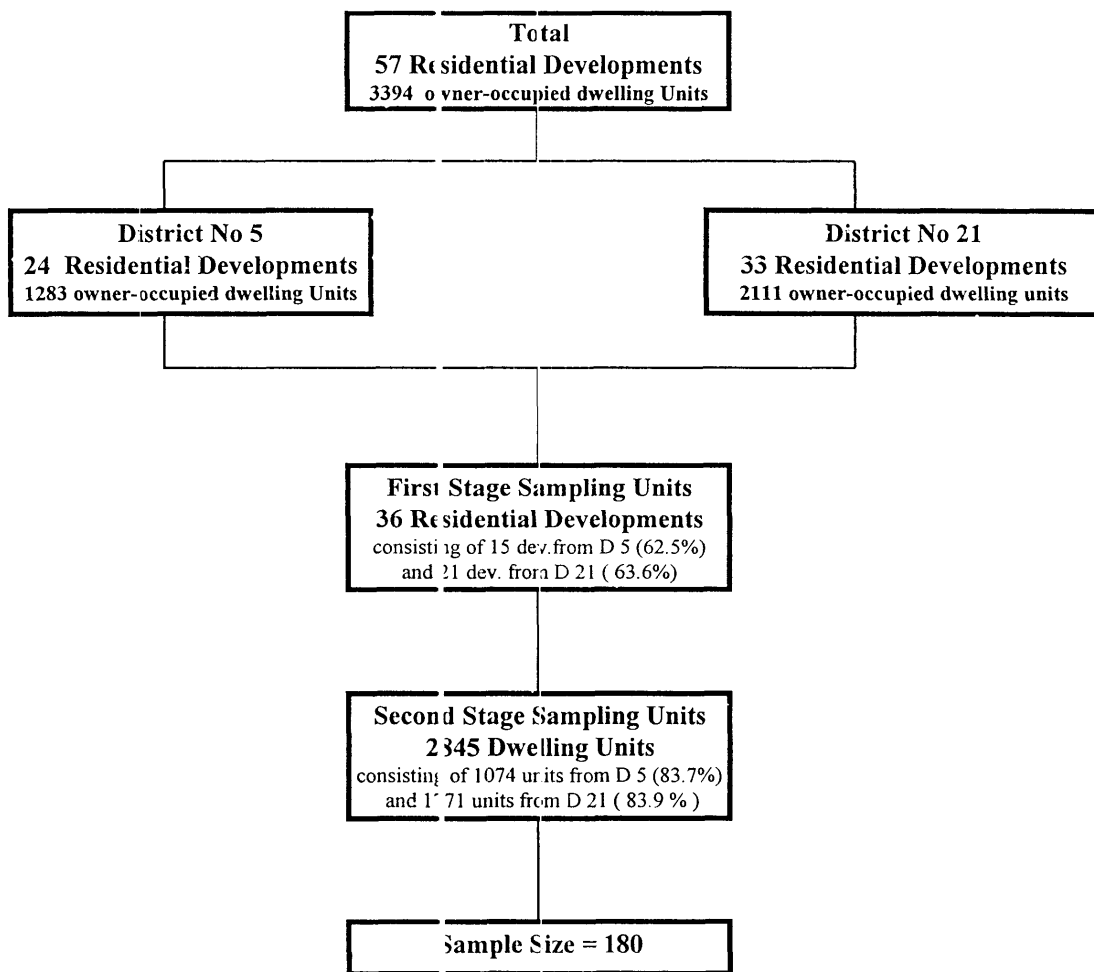


Figure 5-2
Chart Showing Sequence of Sampling
(Source: The Author, 1992)

The first step in the sampling involved defining the population to be studied. This population was grouped into a first stage population and a sub-population for second stage units. In the present study the first stage population was made up of 57 private residential (both landed and condominium) developments (see Tables 5-1 on page 113

and 5-2 on page 114) consisting of 3394 owner-occupied dwelling units. These 57 developments were chosen based on the list supplied by Sim and Yu (1993) and the author's own site investigation of residential developments in districts 5 and 21. The sub-population was made up of 2345 dwelling units (both landed and condominium) in 36 randomly selected developments as shown in Figure 5-2 on page 110 (Foreman, 1991: 216). These 36 residential developments were listed in the Sampling Frame as shown in the attached Tables 5-3 and 5-4 on page 115 and 116 respectively. In order to ensure that both districts were proportionately represented, about 63 per cent of the total number of developments in each district were randomly selected. This resulted in 15 and 21 developments being chosen from districts 5 and 21 respectively. In terms of the total number of owner-occupied dwelling units, about 84 per cent from each of the two districts were chosen, (1074 units from district 5 and 1771 units from district 21) resulting in a sub population of 2845 dwelling units as shown in Figure 5-2 on page 110.

The calculated optimal sample size of this second stage sampling was 180 dwelling units consisting of both landed properties and condominium units (See Figure 5-3 on page 112). Based on the Singapore Real Estate Statistics Quarterly, Fourth Quarter 1992, the total housing stock for the western region was 5161, (see Table 5-5 on page 117). Thus the 180 dwelling units made up about 3.5 per cent of the total dwelling units (inclusive of those not owner occupied) in that region. The same 180 dwelling units, however, accounted for 5.3 per cent of the estimated 3394 (2111 + 1283 = 3394, See Figures 5-2 on page 110) owner-occupied dwelling units in districts 5 and 21 as of May 1994.

In carrying out the survey, it was found that owner-occupiers were in general receptive to the surveyors. This can be explained by the fact that most of the owner-occupiers who live in private housing were in the middle-income group and were in general more educated than their counterparts who live in public housing. To obtain the desired number of completed questionnaires, a total of 991 questionnaires were sent

out. As expected the non-response rate was high. Only 124 questionnaires were returned, resulting in a response rate of 12.5 per cent. Subsequently, 56 face to face follow-up personal interviews were conducted to achieve the required sample size of 180 dwelling units.

The optimal sample size is given by \bar{n}_{opt}

$$\text{where } \bar{n}_{opt} = \sqrt{\left(\frac{C_1}{C_2} \times \frac{1-\delta}{\delta}\right)} \quad \text{equation (1)}$$

where C_1 = The average cost associated with a first stage unit
 = 2 (Estimated cost at S\$ 2)
 C_2 = The average cost associated with a second stage unit
 = 1 (Estimated cost at S\$ 1)

Therefore C = Total Survey Cost
 = 3,000 (Estimated cost S\$ 3,000)
 C_0 = Overhead or fixed Costs
 = 2750 (Estimated cost S\$ 2,750)
 δ = Measure of Homogeneity
 = 0.09 (Recommended value)

Note: δ is a measure of the relationship between the first and the second stage components of variance by comparison with the variance of the population as a whole.

From equation (1)

$$\begin{aligned} \bar{n}_{opt} &= \text{Average size of second stage units} \\ &= \sqrt{\left(\frac{C_1}{C_2} \times \frac{1-\delta}{\delta}\right)} \\ &= \sqrt{\left(\frac{2}{1} \times \frac{1-0.09}{0.09}\right)} \\ &= 4.49 \cong 5 \end{aligned}$$

m_{opt} = Optimum Sample Size for second stage sampling unit

$$= \frac{C-C_0}{C_1+C_2 \times \bar{n}_{opt}} \quad \text{equation (2)}$$

$$= \frac{3000-2750}{2+(1 \times 5)}$$

$$= 35.7 \cong 36$$

Therefore 36 Residential Developments were randomly selected.

Since n = Total number of Optimum Sample Size
 = $\bar{n}_{opt} \times m_{opt}$
 = 5×36
 = 180 units

Therefore 180 Residential (Housing - Owner occupied) units were randomly selected again.

CALCULATION OF OPTIMAL SAMPLE SIZE Figure 5-3 (Source : The author, 1995)

S/no	NAME of DEVELOPMENT	Postal Code	NO of UNITS	TITLE	No of Owner-Occupied Units
1	Brookvale Park	2159	160	999	104
2	Binja Park	2158	150	FH	150
3	Cheng Soon Garden	2159	44	FH	44
4	Chun Tin Court	2159	20	FH	20
5	Clementi Park	2159	489	FH	318
6	Eng Khong Gardens	2159	120	FH	120
7	Eng Khong Mansion	2159	48	FH	30
8	Goodluck Garden	2159	208	FH	135
9	Goodluck View	2159	48	FH	31
10	Green Lodge	2159	80	SLG	48
11	HJ Height	2159	76	FH	68
12	Henley Brookevale Pk	2159	30	FH	30
13	Hock Seng Park	2158	30	FH	30
14	Hong Kong Park	2158	80	FH	80
15	Hoover Park	2159	30	FH	30
16	Hua Guan Garden	2158	50	FH	50
17	Jurong Park	2159	40	FH	40
18	Kilburn Estate	2158	20	FH	20
19	King Albert Park	2159	20	FH	20
20	Kismis Court	2159	26	99	22
21	Kismis View	2159	43	99	39
22	Mandarin Park	2159	60	FH	60
23	Mayfair Park	2158	20	FH	20
24	Pandan Valley	2159	623	FH	311
25	Rainbow Gardens	2159	64	999	51
26	Regina Hill	2159	18	FH	18
27	Sherwood Tower	2158	80	99	52
28	Sun Court	2159	14	FH	10
29	Toh Tuck Garden	2159	16	FH	13
30	Toh Tuck Height	2159	12	99	12
31	Toh Yi Court	2159	18	FH	16
32	Vista Garden	2159	20	FH	20
33	Yu Li Yuan	2158	124	99	99
	Total		2,881		2,111

Notes: 99 = 99-Year Leasehold, 999 = 999-Year Leasehold, FH = Freehold, SLG = Statutory Land Grant

List of Private Housing Estates

[WESTERN REGION : DISTRICT 21]

[as at 12th May 94]

Table 5-1

S/no	NAME of DEVELOPMENT	Postal Code	NO of UNITS	TITLE	No of Owner-Occupied Units
1	Chwee Chian Garden	0511	30	FH	30
2	Faber Hill	0512	80	FH	80
3	Faber Hills Condo	0512	96	SLG	68
4	Flynn Park	0511	72	FH	51
5	Greenacres	0513	73	SLG	47
6	Harbour View Gdn	0511	14	FH	12
7	Hin Seng Garden	0512	88	FH	62
8	Hong Leong Garden	0512	180	999	90
9	Island View	0511	72	FH	48
10	Lynnsville	0511	7	FH	6
11	Palisades	0511	18	FH	9
12	Park West	0512	432	99	216
13	Parkview condo	0512	178	999	98
14	Pasir Panjang Court	0511	14	FH	9
15	Pasir Panjang Gardens	0512	20	FH	13
16	Pepys Hill Condo	0511	33	FH	21
17	Regent Garden	0512	31	FH	20
18	Tai Win Terrace	0512	20	FH	20
19	Tatlee Court	0512	104	999	88
20	The Village	0511	41	FH	25
21	Vista Park	0511	209	99	156
22	Western Grove	0511	18	FH	17
23	Westpeak	0512	142	999	71
24	Westvale	0511	32	FH	26
	Total		2,004		1,283

Notes: 99 = 99-Year Leasehold, 999 = 999-Year Leasehold, FH = Freehold, SLG = Statutory Land Grant

**List of Private Housing Estates
[WESTERN REGION : DISTRICT 5]**

[as at 12th May 94]

Table 5-2

S/NO	NAME OF DEVELOPMENT	PI	NO OF UNITS	TITLE	Owner Occupied	Nos Send out	Remarks
1	Chwee Chian Garden	05 1	30	FH	30	10	Landed
2	Faber Hill	0512	80	FH	80	25	Landed
3	Faber Hills Condo	0512	96	SLG	68	25	Condo
4	Greenacres	0513	73	SLG	47	15	Condo
5	Hin Seng Garden	0512	88	FH	62	20	Condo
6	Hong Leong Garden	0512	180	999	90	30	Condo
7	Park West	0512	432	99	216	80	Condo
8	Parkview condo	0512	178	999	98	30	Condo
9	Pasir Panjang Court	0511	14	FH	9	3	Pri Apt
10	Pasir Panjang Gardens	0512	20	FH	13	5	Pri Apt
11	Tai Win Terrace	0512	20	FH	20	7	Landed
12	Tatlee Court	0512	104	999	88	30	Condo
13	Vista Park	0511	209	99	156	50	Condo
14	Westpeak	0512	142	999	71	20	Condo
15	Westvale	0511	32	FH	26	10	Condo
	TOTAL		1,698		1,074	360	

Key : FH = Freehold
99 = Leasehold 99-year
SLG = Statutory Land Grant
Pri Apt = Private Apartments
Condo = Condominiums
Landed = Landed housing

First Stage Sampling Units in District 5
[as at 12th May 94]

Table 5-3

S/NO	NAME OF DEVELOPMENT	PC	NO OF UNITS	TITLE	Owner Occupied	Nos. Send out	Remarks
1	Binja Park	2158	150	FH	150	50	Landed
2	Cheng Soon Garden	2159	44	FH	44	15	Landed
3	Chun Tin Court	2159	20	FH	20	6	Pri Apt
4	Clementi Park	2159	489	FH	318	130	Condo
5	Eng Khong Gardens	2159	120	FH	120	50	Landed
6	Eng Khong Mansion	2159	48	FH	30	12	Pri Apt
7	Goodluck Garden	2159	208	FH	135	65	Condo
8	Green Lodge	2159	80	SLG	48	16	Condo
9	HJ Height	2159	76	FH	68	30	Condo
10	Hong Kong Park	2158	80	FH	80	25	Landed
11	Hoover Park	2159	30	FH	30	10	Landed
12	Hua Guan Garden	2158	50	FH	50	15	Landed
13	Jurong Park	2159	40	FH	40	15	Landed
14	Kismis View	2159	43	99	39	13	Condo
15	Mandarin Park	2159	60	FH	60	20	Landed
16	Pandan Valley	2159	623	FH	311	120	Condo
17	Rainbow Gardens	2159	64	999	51	20	Condo
18	Sherwood Tower	2158	80	99	52	20	Pri Apt
19	Sun Court	2159	14	FH	10	4	Pri Apt
20	Toh Yi Court	2159	18	FH	16	5	Condo
21	Yu Li Yuan	2158	124	99	99	40	Condo
	TOTAL		2,461		1,771	631	

Key: FH = Freehold
99 = Leasehold 99-year
SLG = Statutory Land Grant
Pri Apt = Private Apartments
Condo = Condominiums
Landed = Landed housing

First Stage Sampling Units in Districts 21
(12th May 1994)

Table 5-4

		Detached	Semi-Detached	Terrace	Flats	Condominiums	All Types
Urban	Count	154	41	202	8,228	2,678	11,303
	Row Percent	1.4	0.4	1.8	72.8	23.7	
	Column Percent	5.9	0.6	1.7	40.6	11.0	
	Total Percent	0.2	0.1	0.3	12.4	4.0	17.0
Suburban	Count	1,841	3,654	7,031	10,815	14,853	38,194
	Row Percent	4.8	9.6	18.4	28.3	38.9	
	Column Percent	70.1	52.6	58.1	53.4	60.9	
	Total Percent	2.8	5.5	10.6	16.3	22.4	57.6
Rural East	Count	217	873	2,182	305	1,824	5,434
	Row Percent	4.0	15.9	30.4	5.6	33.6	
	Column Percent	8.3	12.6	18.0	1.5	7.5	
	Total Percent	0.3	1.3	3.3	0.5	2.7	8.2
Rural West	Count	201	873	1,271	466	2,350	5,161
	Row Percent	3.9	16.9	24.6	9.0	45.5	
	Column Percent	7.6	12.6	10.5	2.3	9.6	
	Total Percent	0.3	1.3	1.9	0.7	3.5	7.8
Rural North	Count	215	1,476	1,416	446	2,685	6,238
	Row Percent	3.4	23.7	22.7	7.1	43.0	
	Column Percent	8.2	21.2	11.7	2.2	11.0	
	Total Percent	0.3	2.2	2.1	0.7	4.0	9.4
Whole Island	Count	2,628	6,950	12,102	20,260	24,390	66,330
	Row Percent	4.0	10.5	18.2	30.5	36.8	100

Primary Source : Real Estate Statistics Quarterly, Fourth Quarter 1992

* 1.4% of all residential properties in the urban area are detached houses.

** 5.9% of all detached houses are in the urban area.

*** 0.2% of all residential properties are detached houses located in the urban area.

**Distribution of Housing Stock by
Property Types and Locality**
[as at 4th Quarter 1992]

Table 5-5

(Source : Real Estate Statistics Quarterly, Fourth Quarter 1992)

5.4 Problems Encountered

Fieldwork problems, both interviewer-related as well as respondent-related, were inevitably encountered (Wong, 1993) and were minimized through the following checklist (Foreman, 1991, Scheaffer *et al.*, 1986, Burns and Bush, 1995) :

Interviewer-Related Problems		
	Problems Encountered	Remedies Employed
1	Errors in asking questions	Proper training of Interviewers.
2	Errors in recording responses	Double checking by co-surveyor.
3	Interviewers' variability	Only two groups of interviewers were trained and employed, thereby reducing the problem of inconsistency due interviewers' variability.

Respondent-Related Problems		
	Problems Encountered	Remedies Employed
1	Response Errors - Semantic Error (i.e. misinterpretation of questions) - False Reporting Error	Having a carefully worded and well prepared questionnaire. Inclusion of a Glossary of Terms to clarify the terms used in the questionnaire. Having a diagram to show the various types of Housing. This being an intentional act by the respondents. However, it was assumed that once the respondent agreed to fill in the self-administered questionnaire, he or she was unlikely to falsify responses without good reasons (Wong, 230). In any case, return responses were carefully vetted to detect incoherent responses.

2	<p>Non-response Errors</p> <ul style="list-style-type: none"> - Refusals - Unsuitable 	<p>Surveys are sometimes perceived as invasion of privacy and thus encounter a high level of non-response. It is nearly impossible to achieve a 100 per cent response rate and as such, non-response was to be expected.</p> <p>However, to reduce the incidence of non-response, a special appeal letter was attached to the questionnaire to tell the respondents of the very tight budget for the conduct of this research study.</p> <p>'Refusals' posed a great problem and this inevitably increased the data-collection costs and also introduced bias into the survey results.</p> <p>Finally, 'unsuitables' refer to questionnaire filled in wrongly by the wrong persons, i.e. by tenants or minors. These returns had to be discarded.</p> <p>In order to increase the Survey Response Rate, the following actions were taken:</p> <ol style="list-style-type: none"> 1. Sending a personalized cover letter. 2. Assuring respondents of anonymity and confidentiality of data. 3. Recalls/revisits were made whenever needed. 4. Identification letters were issued to field surveyors. See Appendix 1. 5. Training was given to the field interviewers.
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(Wong, 1993; Foreman, 1997; Scheaffer *et al.*, 1986; Burns and Bush, 1995)

5.5 Limitations of surveys

The limitations of the whole survey evolve around possible sources of measurement errors. Such errors can distort the true picture of a study, resulting in observations which are no longer an accurate reflection of reality. Measurement error can also attenuate or reduce the observed strength of a relationship between variables, giving the impression that two variables are unrelated when in fact they are related to one another. Another source of measurement error involves the problem of response-set biases i.e. social desirability. This can be regarded as the tendency of many subjects to respond in what they believe to be the most socially acceptable manner (Graziano and Raulin, 1989:75). An example of such a tendency could be the manner in which respondents indicate their incomes or professions.

The problem of finding what people want was also complicated by two factors. First, the majority choice should not be the sole consideration, because social planning must also make provision for the preferences of minorities as far as this is possible. And secondly, what people say they want now may not necessarily be the best indication of what they will want in the future (Gardner,1978:5). Undeniably, to envisage the future with any degree of accuracy is never an easy task. Indeed, it takes a substantial knowledge and good analytical skills to come even close to accurate forecasts of the needs and wants of the people, and there are some social scientists who maintain that “counting heads” does not really tell you what is inside them. They propose instead a phenomenological approach with the emphasis on understanding people as persons and not merely as respondents who answer the questions they are asked in surveys (Gardner,1978:9).

One inadequacy of this survey is the sample size. Because of constraints on budget and manpower, only two private housing districts were selected for the survey. Nevertheless, the survey was carefully planned and carried out in order to minimize sampling errors. Furthermore, because of the limited time and resources, the author could not afford a bigger scale survey. Despite these limitations, data obtained from the survey can contribute to a better understanding of the housing situation and preferences in Singapore.

5.6 Sources of Secondary Data

The advantages of secondary data include its ability to be obtained quickly, its affordability, its availability, and its ability to enhance primary data. (Burns and Bush, 1995:136).

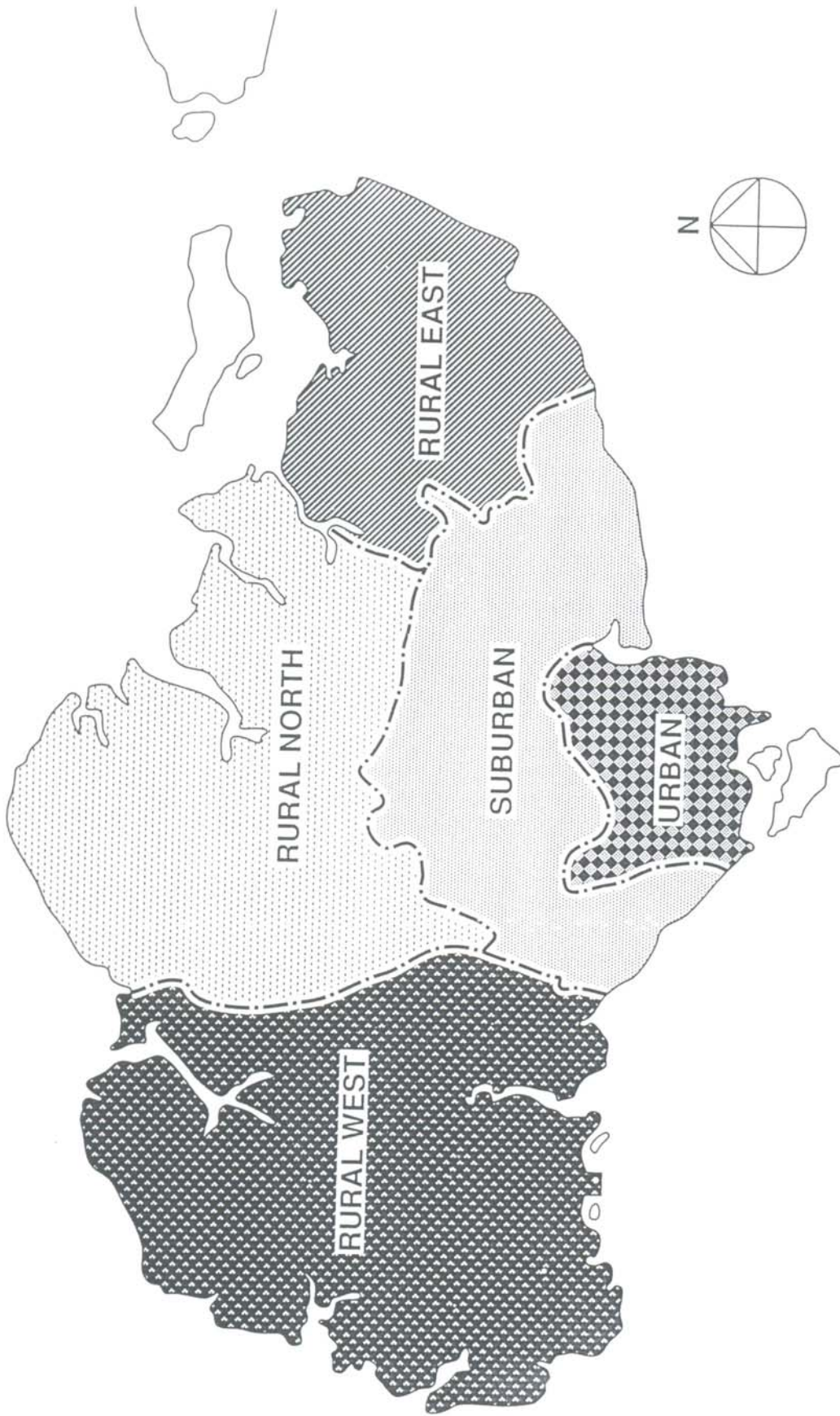
That said, the benefits of having secondary data would be much greater than if reliance was solely on primary data. Besides, as Zikmund (1988) so cogently put it: *"a literature research study or a literature survey of published articles and books discussing the theories and past empirical studies about a topic is almost universal in any academic research project."* Thus, the collection of secondary data is yet another means to obtain relevant information pertaining to the topic of research. Secondary, or historical data, are data previously collected and assembled for some project other than the one at hand (Zikmund, 1988:38). They were found to be of great value in this research. The main sources of Secondary Data are mainly government publications. Other sources such as books, technical reviews and journals etc. were also consulted in the course of this research.

5.7 Data Processing and Analysis

Data analysis involves entering data into computer files, inspecting it for errors, and running tabulations and various statistical tests (Burns and Bush, 1995:63).

Once the field work had been completed, the data had to be converted into a format that would answer the needs of the research. This was systematically carried out by editing and coding of the data. Editing involves checking the data collection forms for omissions, legibility, and consistency in classification, while coding was done through SPSS codes for data entry. Only valid responses from owner-occupiers in the districts of interest were selected for data procession. Other returns such as partially filled questionnaires were rejected. Data processing and statistical analysis were done through the statistical analysis software package, SPSS for Windows Release 5.

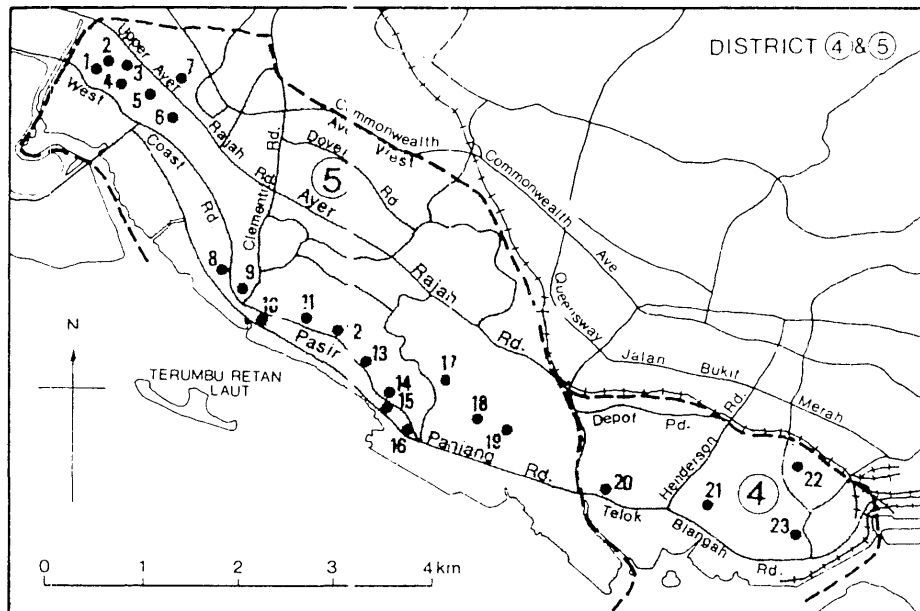
Chapter Six examines the results of the analysis of data in greater detail.



Area Classification for Private Residential Units

Figure 5-4

(Source : Sim & Yu, 1993 :13)



DISTRICT 4		Hin Seng Garden	(4)
Fairways	(20)	Hong Leong Garden	(5)
Mt. Faber Lodge	(23)	Island View	(18)
Pender Court	(21)	Palisades	(13)
Teresa Ville	(22)	Parkview Condominium	(2)
DISTRICT 5		Park West	(7)
Balmeg Court	(14)	Regent Garden	(8)
Edenvale	(11)	Tat Lee Court	(1)
Faber Hills	(3)	The Village	(10)
Flynn Park	(19)	Vista Park	(17)
Greenacres	(9)	Western Grove	(15)
Harbour View	(16)	Westpeak	(6)
		Westvale	(12)

Map showing Private Housing in Districts 4 and 5

Figure 5-6

(Source : Sim & Yu, 1993 :13)