CHAPTER IV

RESIDENTIAL DIFFERENTIATION IN MADRAS URBAN FRINGE

Meaningful interpretation of residential differentiation in the metropolitan urban fringe demands the right technique for the right sort of analytical products. Given the data set we have used in the last chapter, to bring out the residential characteristics using factor analysis, and also the differences in terms of residential development through the interpretation of rotated factor scores, there is the availability of right sort of data for the ten suburbs, which by our urban fringe delineation, fall clearly within the residentially urban areas in the metropolitan area. The technique that has been adopted for analysis here is the multiple discriminant analysis.

Much of the research concerned with residential differentiation, as Timms (1971: 39) reports, has been based on the census tract because

Facts in order to be really significant...should conform to natural areas - units that are actual factors in the process under examination.../and as/...census tracts are manipulated as statistical units in many types of analyses, they should be comparable and homogeneous (as quoted in Timms, 1971: 39).

But as far as Indian census tracts are concerned, they do not provide such data as would help us in the understanding of residential differentiation. So, we
have used in the analyses here the area statistics collected from the respondents. The one limitation therefore is that the data set considered is inadequate, for much information is required if one is to attempt an understanding of the urban communities in terms of residential differentiation. Inasmuch as we have considered the indicants used earlier in the previous chapter as sufficient enough for understanding residential characteristics, the same set of indicants as diagnostic and measurable criteria can be used in the residential differentiation analysis.

Analysis of Residential Differentiation

The present analyses thus use the data sets for the individual areas (so, disaggregated for the areas). However, the ten urban fringe areas have not been discriminated with each other in a single analysis, for such an analysis would only give rise to a single set of multiple predictors of residential differentiation. Hence, six discriminant analyses, involving two areas in a single analysis, have been made so that at least six different sets of multiple predictors can be extracted. The one reason why only six analyses have been made is that (a) ten analyses would have been prohibitively expensive in terms of time and money and (b) interpreting the results would be that much more
complicated. Yet, it must be mentioned that the six different pairs among the forty-five possibles have been so carefully selected as to make the predictors as different as possible. The six areas discriminated against six others are as follows:

1 Ambattur Vs Adayar
2 Kathivakkam Vs Pallavaram
3 Adayar Vs Pallavaram
4 Kathivakkam Vs Adayar
5 Arumbakkam Vs Kathivakkam
6 Thiruvottiyur Vs Alandur

As can be seen, Adayar is ranged against Ambattur, Pallavaram and Kathivakkam while Kathivakkam is ranged against Adayar as well as Pallavaram. Arumbakkam is discriminated against Kathivakkam while Thiruvottiyur is discriminated against Alandur. The latter is a select discrimination while others, in a sense, are cross-discriminations for the reason the analyses could provide us with distinctly different multiple predictors. The assumption here is that, effectively, the indicants are a measure of what we purport to understand: residential differentiation. Under the circumstances, given the results interpreted in the previous chapter, the indicants can hardly be considered
invalid, but they provide measures of residential differentiation.

The Hypothesis

There are no statistically significant differences between the areas discriminated against each other is the hypothesis to be tested in the six analyses of the multiple discriminant function. The test of significance however is the F-test computed and the question of how different are the areas is measured by the Mahalanobis' distance. Whether or not there are significant differences between the areas discriminated, the multiple predictors or discriminators tell us something about the residential differentiation in the areas discriminated. And among the discriminants, the most important would be those which contribute significantly to the discrimination. It is these indicants that would show residential differentiation in the urban fringe of the metropolitan area under study. Additionally; the analyses provide us with the discriminant scores which can be used in classifying the residential occupants/developers into definable groups.

Thus discriminant analysis helps not only in the residential differentiation but also in the classification of resident-respondents in terms of differentiation.
Residential Differentiation in the Urban Fringe of Madras

In micro- and macro-social analyses, the application of factor analytic techniques to urban residential differentiation has produced relatively consistent results. It is even well established that much of the detailed variation in the characteristics of urban sub-communities may be interpreted in terms of three-four underlying constructs relating to differences in socioeconomic status, family composition, ethnicity and mobility. Social analyses indicate therefore that the social residential differentiation of the urban population is a function of the axes of social differentiation extent in the society concerned.

In micro- and macro-spatial analyses, also, the urban residential differentiation is reflected in a sifting and sorting of populations and locations. That is, as the city develops and spreads, typical patterns of differentiation become apparent. Timms (1971: 211) states that different areas become associated with particular types of population and certain systemic relationships between geographical space and social space appear. The concern of the present chapter is therefore with the spatial aspects of residential differentiation, and more particularly with the validity of the analytical results reported here.
The one reason we have not used factor analytic procedure here is that spatial aspects of residential differentiation require small area statistics that can be analysed and the results mapped. With census tracts constrained in terms of relevant data with respect to suburban/urban fringe locations, the only data we could fall back on are of micro-social data of relationship between residential differentiation and patterns of individual decisions and behaviour. But then, there is need to make out differences in urban residential characters in terms of small areas. Hence the use of discriminant analysis for bringing out spatial urban residential differentiation between the city suburban/urban fringe locations through the individual developer/tenant data, in the residential development process.

It follows from above that we cannot, because we are not using census tracts, use conventional structural aspects of urbanisation such as size, density and heterogeneity (see Timms for postulates and effects of these three aspects in terms of urbanism; also see Shevky and Bell, 1955:7-8). However, we could still use the axiom residential differentiation parallels social differentiation. The basis of this axiom is that the differential evaluation given to the perceived
differences between individuals and groups of individuals (developers and tenants) forms the basis for much of the decision-making involved in residential location.

The residential decisions have implications for a wide range of behaviours and sentiments. For an urban dweller, whether he is a residential developer or a tenant, the decision is a function of a series of individual evaluations, of information flows, and of the presence of absence of suitable services and amenities.

In other words, the residential developer or tenant of Madras urban fringe evaluates his residential location in terms of rent, house conveniences, travel time and cost to work places, proximity or otherwise of residential location to highways, bus termini, railway stations, schools and health centres, banks, in-house amenities, more especially, lavatory, bathrooms, kitchen, living room, water supply and the nature of locality.

So, such aspects as these could be the bases for both residential and also social differentiation. It is on the basis of these that we may usefully discriminate the areas and see whether the residential areas chosen for survey and analysis show up residential
differentiation. The predictors may then be used to determine that group of aspects that differentiate residences of one area with that of another. In this way, we may even be able to build those categories into which residential areas are divided and in whose terms they receive differential treatment. Taking the aspects above as different locational requirements, and the extent to which the residential fabric of the city urban fringes exhibit sufficient variety for differences in them, they may be taken for analysing residential differentiation. That is exactly what the present analysis has done. It must be emphasised that for suburban/urban fringe residential developers and tenants these are very important and their importance cannot be overemphasised.

Ambattur and Adyar

The two areas, although the former is an industrial suburb and the latter is a residential suburb but within the city, do not show much residential differentiation as can be seen in terms of Mahalanobis distance. The F-test however shows that the differences are significant.

F Test Value 1.8445 with 39 and 133 degree of freedom

(F Test critical value 1.70 at 0.01 level of significance 1.46 at 0.05 level of significance)
Mahalanobis distance (D square) 0.03

Common Mean (Rzero) 0.0134
Group I (Area A) Mean R1 0.0268
Group II (Area B) Mean R2 0.0001

The multiple predictors in this case are given in Table 4.1. Of the predictors, or discriminants, distance from home to railway station contributes to the discrimination enormously than others. This is because Ambattur is a railway terminus and being in the

Table 4.1: Ambattur and Adayar: Predictors

<table>
<thead>
<tr>
<th>Variable No.</th>
<th>Variable</th>
<th>% added</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Distance from house - Railway station</td>
<td>61.66</td>
</tr>
<tr>
<td>20</td>
<td>Site of the house before construction</td>
<td>14.48</td>
</tr>
<tr>
<td>14</td>
<td>Distance from house - Market</td>
<td>12.71</td>
</tr>
<tr>
<td>34</td>
<td>Fencing</td>
<td>10.9</td>
</tr>
<tr>
<td>16</td>
<td>Distance from house - Groceries</td>
<td>8.94</td>
</tr>
<tr>
<td>38</td>
<td>Times travelled (minutes)</td>
<td>3.64</td>
</tr>
<tr>
<td>28</td>
<td>Number of living room</td>
<td>2.78</td>
</tr>
<tr>
<td>30</td>
<td>Independent bathroom</td>
<td>2.22</td>
</tr>
<tr>
<td>15</td>
<td>Distance from house - Health Centre</td>
<td>1.43</td>
</tr>
<tr>
<td>11</td>
<td>Distance from house - Highways</td>
<td>1.13</td>
</tr>
</tbody>
</table>

Source: Computer Run.

Outskirts, getting to and from city, becomes important and in getting about trains are faster than the buses which ply between Ambattur and city areas. As for Adayar, the only means of transport at close quarters is that of bus. Site, distance to market, distance to
grocery shops contribute handsomely. These indicate that for Ambattur and Adayar respondents these facilities become more important than the others. Note that travel time, number of living rooms, distance to health centre and highways do not weigh much.

It appears that transport access and access to markets and grocery shops, the essential facilities for social living, determine the discrimination analysed rather than any other variables.

Figure 4.1 indicates that except for one or two observations all others form two distinct groups, Adayar and Ambattur respondents on their respective sides. There is no misclassification of individuals, however, even though Adayar presents a cluster slightly to the right of the mean of its own.

Kathivakkam and Pallavaram

There is very little difference between the two urban fringe areas (both somewhat industrial and residential) is seen in D-square and this is proved to be insignificant statistically.

F Test Value 1.0165 with 39 and 157 degree of freedom

(Critical value 1.70 at 0.01 level)
1.46 at 0.05 level of significance

Mahalanobis distance (D square)  0.03
While there seems to have been some lack of substantial contributions to the discrimination (table 4.2), it is seen that the analysis presents yet another set of discriminators. Fencing appears to hold out significant contributions. There is a clear perspective that the urban fringe people do think upon and evaluate housing conditions. While distance to railway station, groceries and housing conditions do not contribute much to the discrimination, the others included in the list are even less important as predictors. Perhaps because the groceries and railway station (in both urban fringe localities) are rather closer to residential areas, they do not appear to be good discriminators in the analysis.

Table 4.2: Kathivakkam and Pallavaram: Predictors

<table>
<thead>
<tr>
<th>Variable No.</th>
<th>Variable</th>
<th>% added</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>Fencing</td>
<td>21.87</td>
</tr>
<tr>
<td>22</td>
<td>Built up area</td>
<td>17.32</td>
</tr>
<tr>
<td>37</td>
<td>Number of floor</td>
<td>12.14</td>
</tr>
<tr>
<td>27</td>
<td>General condition</td>
<td>11.10</td>
</tr>
<tr>
<td>25</td>
<td>Type of construction</td>
<td>10.23</td>
</tr>
<tr>
<td>13</td>
<td>Distance from house - Railway station</td>
<td>9.44</td>
</tr>
<tr>
<td>16</td>
<td>Groceries</td>
<td>5.42</td>
</tr>
<tr>
<td>39</td>
<td>Type of house</td>
<td>5.07</td>
</tr>
<tr>
<td>9</td>
<td>Age of the house</td>
<td>4.37</td>
</tr>
<tr>
<td>10</td>
<td>Rent/Rental value</td>
<td>4.24</td>
</tr>
</tbody>
</table>

Source: Computer Run
Figure 4.2 presents a mix of respondents of both Kattivakkam and Pallavaram and it is difficult to discern groupings. Several of the observations stand misclassified and such misclassified observations lead to a coalescence of the two groups.

Adayar and Pallavaram

Yet again, there is not much difference between the two groups of observations discriminated and the statistical test proves that whatever discrimination there is, is not significant.

F Test Value 1.0296 with 39 and 159 degree of freedom

(Critical value 1.70 at 0.01 level)
1.46 at 0.05 level of significance

Mahalanobis distance (D square) 0.14

Common Mean (Rzero) 0.0717
Group I (Area A) Mean R1 0.1435
Group II (Area B) Mean R2 0.0000

The significant contributors to the discrimination between the two areas, and hence the good discriminators, are those of distances to facilities such as railway station, market and highways. Others, slightly less important as predictors of discrimination, are distance to bus terminus, provision stores and banks (table 4.3). Two distinct groups are observable from figure 4.3, and yet that of Pallavaram is slightly skewed than that of Adayar.
RESIDENTIAL DIFFERENTIATION
RESIDENTIAL DIFFERENTIATION

fig 4.3
Table 4.3: Adyar and Pallavaram: Predictors

<table>
<thead>
<tr>
<th>Variable No.</th>
<th>Variable</th>
<th>% added</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Distance from house - Railway station</td>
<td>43.02</td>
</tr>
<tr>
<td>14</td>
<td>Distance from house - Market</td>
<td>26.02</td>
</tr>
<tr>
<td>11</td>
<td>Distance from house - Highway</td>
<td>12.22</td>
</tr>
<tr>
<td>10</td>
<td>Rent/Rental Value</td>
<td>8.11</td>
</tr>
<tr>
<td>12</td>
<td>Distance from house - Bus terminus</td>
<td>7.39</td>
</tr>
<tr>
<td>36</td>
<td>Electricity</td>
<td>5.64</td>
</tr>
<tr>
<td>16</td>
<td>Distance from house - Provision</td>
<td>4.56</td>
</tr>
<tr>
<td>18</td>
<td>Distance from house - Bank</td>
<td>4.56</td>
</tr>
<tr>
<td>26</td>
<td>Types of flooring</td>
<td>2.43</td>
</tr>
<tr>
<td>4</td>
<td>Number of Mobile persons</td>
<td>2.23</td>
</tr>
<tr>
<td>22</td>
<td>Built up area</td>
<td>1.74</td>
</tr>
</tbody>
</table>

Source: Computer Run

Kathivakkam and Adyar

The distance function computed shows a small value and hence it may be inferred that the differences are not very many/much. Correspondingly, the F-test also indicates the statistical insignificance.

F Test Value 1.0102 with 39 and 159 degree of freedom

(Critical value 1.70 at 0.01 level)
1.46 at 0.05 level of significance

Mahalanobis distance (D square) 0.16

Common Mean (Rzero) 0.0784
Group I (Area A) Mean (R1) 0.1567
Group II (Area B) Mean (R2) 0.0000

Here again, the distance to railway station is the most important predictor and all others are insignificant contributors to discrimination. However, these include distance to groceries, highways, utility
services after the occupation of the house, distance to
bank and other in-house amenities and social services
(table 4.4).

Table 4.4: Kathivakkam and Adayar: Predictors

<table>
<thead>
<tr>
<th>Variable No.</th>
<th>Variable</th>
<th>% added</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Distance from home - Railway station</td>
<td>73.1</td>
</tr>
<tr>
<td>16</td>
<td>Distance from home - Groceries</td>
<td>7.95</td>
</tr>
<tr>
<td>11</td>
<td>Distance from home - Highways</td>
<td>4.7</td>
</tr>
<tr>
<td>24</td>
<td>Utility service after occupation</td>
<td>3.51</td>
</tr>
<tr>
<td>18</td>
<td>Distance from home - Bank</td>
<td>3.40</td>
</tr>
<tr>
<td>33</td>
<td>Fixture - Bombay or Indian closet</td>
<td>1.8</td>
</tr>
<tr>
<td>17</td>
<td>Education</td>
<td>1.74</td>
</tr>
<tr>
<td>35</td>
<td>Water connection</td>
<td>1.64</td>
</tr>
<tr>
<td>14</td>
<td>Market</td>
<td>1.4</td>
</tr>
<tr>
<td>36</td>
<td>Electricity</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Source: Computer Run

Figure 4.4 indicates two distinct clusters of observations, with each on the respective sides of the discriminant function line, with two of Adayar and one of Kathivakkam respondents falling within the misclassified group.

Arumbakkam and Kathivakkam

The differences between the residences of Arumbakkam and Kathivakkam are insignificant statistically is borne out by the analysis.

F Test Value 0.9374 with 39 and 145 degree of freedom
(Critical value 1.70 at 0.01 level)
1.46 at 0.05 level of significance
Mahalanobis distance (D square) 0.04

Common Mean (Rzero) 0.0221
Group I (Area A) Mean (R1) 0.0441
Group II (Area B) Mean (R2) 0.0000

The discriminators here are very different to the ones reported already for other analyses. The good determinants as can be seen from table 4.5 are site, bank, rent, water connection and distance to railway station. They are very significant when compared to other discriminants such as lavatory fixture, distance to highways, length of residence and occupation.

Table 4.5: Arumbakkam and Kathivakkam: Predictors

<table>
<thead>
<tr>
<th>Variable No.</th>
<th>Variable</th>
<th>% added</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Site of the house before construction</td>
<td>27.49</td>
</tr>
<tr>
<td>18</td>
<td>Bank</td>
<td>21.97</td>
</tr>
<tr>
<td>10</td>
<td>Rent/Rental value</td>
<td>19.25</td>
</tr>
<tr>
<td>35</td>
<td>Water connection</td>
<td>11.26</td>
</tr>
<tr>
<td>13</td>
<td>Distance from house - Railway station</td>
<td>11.25</td>
</tr>
<tr>
<td>33</td>
<td>Fixture - Bombay or Indian closet</td>
<td>6.55</td>
</tr>
<tr>
<td>11</td>
<td>Distance from house - Highways</td>
<td>6.5</td>
</tr>
<tr>
<td>7</td>
<td>Cost in Rupees</td>
<td>5.5</td>
</tr>
<tr>
<td>3</td>
<td>How long residence (No. of years)</td>
<td>5.3</td>
</tr>
<tr>
<td>1</td>
<td>Occupation</td>
<td>3.29</td>
</tr>
</tbody>
</table>

Source: Computer Run

The discriminant function line in figure 4.5 shows a mixed distribution of observations with two very fluid groups and the misclassifieds are but a few.
Thiruvottiyur and Alandur

Yet another case where discrimination is significantly statistically discernible. The significant F-test value bears this out.

F Test Value 1.8690 with 39 and 135 degree of freedom
(Critical value 1.70 at 0.01 level)
1.46 at 0.05 level of significance

Mahalanobis distance (D square) 0.02

Common Mean (Rzero) 0.0079
Group I (Area A) Mean (R1) 0.0158
Group II (Area B) Mean (R2) 0.0000

Here again, the discriminants are as varied as they can be from others. Distance to market is the maximum contributor, while water connection, separate kitchen, type of house, education, type of lavatory and educational institution are the moderate contributors (table 4.6).

Table 4.6: Thiruvottiyur and Alandur: Predictors

<table>
<thead>
<tr>
<th>Variable No.</th>
<th>Variable</th>
<th>% added</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Distance from house - Market</td>
<td>74.3</td>
</tr>
<tr>
<td>35</td>
<td>Water connection</td>
<td>30.9</td>
</tr>
<tr>
<td>29</td>
<td>Separate kitchen</td>
<td>18.4</td>
</tr>
<tr>
<td>39</td>
<td>Type of house</td>
<td>14.5</td>
</tr>
<tr>
<td>2</td>
<td>Education</td>
<td>11.4</td>
</tr>
<tr>
<td>32</td>
<td>Type of lavatory</td>
<td>10.7</td>
</tr>
<tr>
<td>17</td>
<td>Education Institution</td>
<td>10.3</td>
</tr>
<tr>
<td>25</td>
<td>Type of construction</td>
<td>7.27</td>
</tr>
<tr>
<td>8</td>
<td>House value (0000's.)</td>
<td>5.8</td>
</tr>
<tr>
<td>18</td>
<td>Bank</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Source: Computer Run
Despite significant differences between the two areas, as figure 4.6 indicates, the grouping of observations is not immediately possible. But there is just one group of observations, differing slightly in its distribution; the cluster is around the common mean although the distribution along the discriminant function is more widespread.

Thus only in two of the six analyses, the discriminant function has shown statistically significant differences even while the Mahalanobis distance has been small in each of the cases. Two major conclusions emerge of urban fringe residential differentiation:

* The suburban/urban fringe locations are neither completely different from each other nor show statistically significant differences in comparison with others, except in two cases.

* It follows from above that, residually, the suburbs/urban fringes are not very different from each other, but at the same time exemplify the fact they are part of a rural metropolis, by which the city of Madras used to be referred to in the seventies, for the reason the density gradient did not dip with distance. In residential development, too, this appears to have been true in terms of differentiation among the ten sample areas and the peripheries.

Hence, the residential differentiation in the Madras Metropolitan Area is not immediately observable,
RESIDENTIAL DIFFERENTIATION

fig 4.6
whether or not the location is an inner city area or urban fringe.

Home-Work Journey

It is clear that the structural residential characteristics, extracted using factor analytic procedures, point out to eight factors: in-house amenities, pre- and post-occupancy facilities, age of residence, home-to-work journey, value-facility-rent, plinth and site, banking and transport and market facilities. Except for the first, third and sixth, all others are in some way related to facilities over which residential development decisions depend. Of these, more important is that of home-to-work journeys, even though access to other facilities (like school, higher educational institutions, health/medical facilities, markets and so on) are also very important.

The Indian residential scenario is such that residential developers as well as tenants renting houses consider access to facilities, and more importantly work places, a very important facet in their residential development/renting decisions. The micro-social survey has solicited specific information on journey-to-work and this information is now used here for interpretative purposes. There are clearly differences in the home-to-work journey patterns between the ten sampled areas is
examined so that we may show to what levels or how much residential development in urban fringes differ in terms of these patterns.

Human movement, it must be emphasised, is an important theme in urban system organisation since it brings out the relationships between and among the parts of individual urban system, Madras metropolis in our case. The short-run dynamics of intraurban travel to work - short run because it involves smaller distances and repeated daily movements such as commuting - may be patterned into a single-purpose home-work travel and a multi-purpose services seeking trips. Either explains the urban spatial structure and the spatial behaviour, while being a travel demand facilitating a nontravel activity (a job in an industry, for example). Additionally, the patterns provide us insights on socioeconomic characteristics of the population engaged in travel.

Access to essential services is a basic right, although there is still no general agreement as to what constitutes equal access. So a community, residing in the urban fringes, elects to live in a place where public as well as private services are available generally to all. The residential areas are therefore closer to service locations. In the context of Madras
metropolis, this is true. But there are some constraint factors: for example, the spatial structure of urban residential areas determine a large part of the inequalities in geographical access to services. The gravitation of residential developers and tenants is therefore to those areas where the spatial inequalities are minimal. The travel patterns in a sense reflect the impact of this constraint and hence the negative exponential relationship between distance and the proportion of trips.

Figures 4.7 and 4.8 home-work trips and associated spatial positions for the extra-city areas and the city areas and the rays connect the respondent households with the work places of members of these households. It is evident from the patterns of travel as well as data that most trips are made to short distances than long and indicate also that people locate themselves at distances close to their work places, barring of course a few exceptions. The exceptions are however those who prefer remote/rural surroundings to noisy and often anonymous city areas. Such preferences are exercised by the middle class families who, it would seem, occupy the urban residential fringes in large numbers either as developers or as tenants.
The travel pattern in figure 4.7 indicates that there are large scale short distance home-work trips in respect of Kathivakkam, Ennore and Thiruvottiyur in the northeast of Madras metropolis and the trips within sampled areas are indicated by number in the circles. Trips outside the metropolitan area are to Vellore and Ponneri in the north and Chingleput and Mahabalipuram in the south and these trips are but a few. On the west of the metropolis, however, the trips confine to either workplaces within the metropolis or sampled areas themselves. The westernmost point is Poonaimalai. As far home-work travel to inner-city areas, as can be seen from figure 4.8), a large number of trips is directed to Parrys (102 trips, of which 12 are from Ambattur and 22 are from Arumbakkam), Mount Road (60 trips, of which 14 are from Saligramam and 12 are from Pallavaram) and to such areas as Guindy (29 trips), Egmore (24 trips), Adayar (19 trips), Kodambakkam (18 trips), Mylapore (15 trips), Saidapet (14 trips) and Perambur (13 trips). All other trips are small in number although the destinations are varied.

It is seen from respondent data that a good number of home-work trips do not incur travel cost and the highest is in the case of Thiruvanmiyur (121 trips) followed by Adayar (97 trips), Kathivakkam (73 trips),
Arumbakkam (44 trips), Ambattur (39 trips) and Saligramam (38 trips), although these trips involve distances and time. This, together with the information above, indicate to a large scale short-run trips. The short-run reflects in a sense the socioeconomic characteristics of the urban fringe residents as well. There is a negative relation between distance travelled and the proportion of trips is borne out by the data and that this relation is negative exponential - that is, with increasing distances there is decreasing proportion of trips. The smallest distance travelled is as little as a few metres and the longest is in excess of 100 km, but the majority is within a zone of 10 km because distances beyond prove to be expensive and trips tiresome.

The ten individual runs using travel cost, distance and travel time data in the multiple regression analyses yielded the results presented in tables 4.7 through 4.9. The intercorrelations show that except for four pairs of relationships all others are significantly correlated and however all of them are positive. Interpretation of the r values can be straightforward: a high positive r value shows that geographical access favours high travel cost rather than low travel cost. But then the r values reflect the relationship between an incomplete set of
factors and as such the distribution of these values show various levels of differential geographical access across income groups, because the ability to pay for travel depend on income. The multiple r values again indicate the positive relationship between the travel cost and the predictors to mean the differential access with reference to the ten sample areas and the work places. The goodness of fit in most cases is less than 40 per cent, and in fact it is in one case only (Madhavaram) that it exceeds 40 per cent, showing thus the strength of differential access to work places in terms of travel cost. Most people however do not incur travel cost is supportive of proper residential selection process with respect to income levels (see table 4.8). The multiple r is statistically significant in all cases except those of Ambattur, Saligramam, Adyar and Thiruvanmiyur. The F test however finds multiple r values significant in nine cases and this finding verifies the assumption of a linear functional relationship between travel cost and the predictor variables.

The variable rates of change in travel cost, involving home-work trips, are shown in table 4.9 under standardised partial regression coefficients. These indicate, besides some insignificant and even negative
Table 4.7: Relationships Between Dependent (Cost) and Independent Variables (Distance and Time)

<table>
<thead>
<tr>
<th>Sample Area</th>
<th>Cost vs Dist.</th>
<th>Cost vs Time</th>
<th>Time vs Dist.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Kathivakkam</td>
<td>0.5489</td>
<td>0.5462</td>
<td>0.8479</td>
</tr>
<tr>
<td>2 Thiruvottiyur</td>
<td>0.6343</td>
<td>0.3927</td>
<td>0.4343</td>
</tr>
<tr>
<td>3 Madhavaram</td>
<td>0.7934</td>
<td>0.7659</td>
<td>0.9403</td>
</tr>
<tr>
<td>4 Ambattur</td>
<td>0.7580</td>
<td>0.2694</td>
<td>0.7326</td>
</tr>
<tr>
<td>5 Arumbakkam</td>
<td>0.5588</td>
<td>0.4494</td>
<td>0.7960</td>
</tr>
<tr>
<td>6 Saligrasam</td>
<td>0.4060</td>
<td>0.2512</td>
<td>0.6658</td>
</tr>
<tr>
<td>7 Alandur</td>
<td>0.4862</td>
<td>0.4686</td>
<td>0.8148</td>
</tr>
<tr>
<td>8 Pallavaram</td>
<td>0.6503</td>
<td>0.7162</td>
<td>0.7923</td>
</tr>
<tr>
<td>9 Adayar</td>
<td>0.4023</td>
<td>0.2950</td>
<td>0.6317</td>
</tr>
<tr>
<td>10 Thiruvanmiyur</td>
<td>0.0532</td>
<td>0.0778</td>
<td>0.7527</td>
</tr>
</tbody>
</table>

Source: Computer Runs.
changes, the positive changes that occur because of distance and travel time.

A particular fact that warrants attention is that urban fringe residential development occurs essentially because of population concentrations in the fringe areas, taking advantage of low land value, low rent, tolerably good facility network or at least quick access to these through road and rail network and the attitude of the middle class to get ahead socially as well as economically. Hence, these characteristics determine in a way the nature of residential differentiation in the fringes. Home-work journey reflects more fully such differentiation than any other set of variables.

Table 4.8: Home-Work Journey: Relations

<table>
<thead>
<tr>
<th>Sample Areas</th>
<th>Multiple R</th>
<th>R^2</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kathivakkam</td>
<td>0.4926</td>
<td>24.3</td>
<td>15.38</td>
</tr>
<tr>
<td>Thiruvottiyur</td>
<td>0.3217</td>
<td>38.6</td>
<td>26.15</td>
</tr>
<tr>
<td>Madhavaram</td>
<td>0.6689</td>
<td>44.8</td>
<td>16.00</td>
</tr>
<tr>
<td>Ambattur</td>
<td>0.2266</td>
<td>5.1</td>
<td>1.57</td>
</tr>
<tr>
<td>Arumbakkam</td>
<td>0.5233</td>
<td>27.4</td>
<td>23.20</td>
</tr>
<tr>
<td>Saligramam</td>
<td>0.2980</td>
<td>8.9</td>
<td>5.51</td>
</tr>
<tr>
<td>Alandur</td>
<td>0.3950</td>
<td>15.6</td>
<td>11.55</td>
</tr>
<tr>
<td>Palliavaram</td>
<td>0.6140</td>
<td>37.7</td>
<td>33.27</td>
</tr>
<tr>
<td>Adayar</td>
<td>0.2874</td>
<td>8.3</td>
<td>4.59</td>
</tr>
<tr>
<td>Thiruvanmayur</td>
<td>0.0617</td>
<td>0.4</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Source: Computer Runs.
Table 4.9: Regression and Standardised Partial Coefficients
(Home-work journey)

<table>
<thead>
<tr>
<th>Sample Areas</th>
<th>Cost</th>
<th>Reg.Coeff</th>
<th>Spr.Coeff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Dist</td>
<td>Time</td>
</tr>
<tr>
<td>1 Kathivakkam</td>
<td>0.0000</td>
<td>0.8480</td>
<td>0.2114</td>
</tr>
<tr>
<td>2 Thiruvottiyur</td>
<td>0.1744</td>
<td>3.0631</td>
<td>0.1169</td>
</tr>
<tr>
<td>3 Madhavaram</td>
<td>0.3488</td>
<td>4.6494</td>
<td>0.3380</td>
</tr>
<tr>
<td>4 Ambattur</td>
<td>0.9184</td>
<td>-0.2314</td>
<td>0.3270</td>
</tr>
<tr>
<td>5 Arumbakkam</td>
<td>0.0000</td>
<td>3.6937</td>
<td>0.0191</td>
</tr>
<tr>
<td>6 Saligramam</td>
<td>0.2155</td>
<td>4.4629</td>
<td>-0.0973</td>
</tr>
<tr>
<td>7 Alandur</td>
<td>0.0781</td>
<td>1.5962</td>
<td>0.3137</td>
</tr>
<tr>
<td>8 Paliavaram</td>
<td>0.0885</td>
<td>0.5357</td>
<td>0.4436</td>
</tr>
<tr>
<td>9 Adayar</td>
<td>0.1429</td>
<td>1.1030</td>
<td>0.0669</td>
</tr>
<tr>
<td>10 Thiruvanmyur</td>
<td>0.0694</td>
<td>-0.0324</td>
<td>0.0815</td>
</tr>
</tbody>
</table>

Source: Computer Runs.
In sum, this chapter has attempted to measure residential differentiation through discriminant analysis and has found that very small differences exist between them in residential characteristics, perhaps because the occupational and other compositional elements do not appear to be different in one locality with respect to another. However, the residential differentiation could be seen in the context of access to services and more importantly home-work relationships.