A BEHAVIOURAL APPROACH TO THE STUDY

OF RETAIL LOCATION.

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SUMMARY

A Behavioural Approach to the Study of Retail Location.

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The thesis develops a behavioural model of retail location which differs from established models in two respects. Firstly, the behavioural model emphasizes the demand for retail outlets rather than the supply of retail outlets. Instead of focusing attention on existing shopping opportunities and assessing their attraction potential, the behavioural model concentrates on the home base of the consumer and attempts to assess how far he/she is able to travel to a shopping location. In addition, emphasis on demand involves the development of a model within the framework of established consumer behaviour theory, thereby using psychological and sociological constructs to help explain store selection behaviour. Secondly, the behavioural model differs from established location theory in that an attempt is made to study the act of shopping in relation to other human activities in which people are involved.

The basic postulate of the model is that people are constrained in their shopping behaviour. They are constrained by the commitments they have to the other activities in which they are involved, by their ability to travel, by their attitudes towards shopping, and by their available storage facilities at home. These four constraint characteristics are used to classify shoppers on a scale of constraints which ranges from highly constrained to highly unconstrained behaviour. It is hypothesized that a person's position on the constraints scale may be used as a basis for predicting store selection behaviour.

Primary data was collected to test the hypothesis by using the technique of house to house interviewing. Analysis was performed with the aid of a computer and involved extensive use of multivariate statistical techniques.

The constraints scale proved to be an inadequate analytical tool at the level of analysis considered. Therefore an alternative approach was developed by establishing groups of shoppers that displayed significantly different retail store selection behaviour patterns. This approach involved an unusual combination of the techniques of cluster analysis and discriminant analysis.

TO   MY   PARENTS

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CHAPTER 1

INTRODUCTION

The theory of retail location has been built on only a few fragile, and sometimes non-related, foundation stones. Its present status is the result of fragmented contributions from various interested groups of people who have different working backgrounds. Such groups have included retailers, planners, geographers, consumers, mathematicians, marketers, economists, and consumer behaviourists. By their contributions and re-interpretations of ideas these people have produced a somewhat confusing state of affairs for themselves. One problem is that there appears to be no commonly accepted basis for an analytical breakdown of the subject which would give it both a comprehensive and a meaningful coverage. Different writers have approached the subject in many varied ways. Some break it down into its theoretical and empirical contributions, some into an analysis of trade areas and shopping patterns, and others into various spatial levels of enquiry. What has tended to happen is that theories, findings, and models have been wrongly interpreted and applied to situations for which they have no relevance. However, it is the intention of this thesis to concentrate on spatial levels of enquiry and to develop a workable model of retail location which could be applied to location problems arising within large urban areas. A model applicable to these situations was chosen for two reasons; firstly, because most retailing activity is currently occurring in and around large urban areas, and secondly, because there is a definite lack of theory which may be applied at this level of analysis. Both these aspects are fully discussed in chapters two and three respectively.

Existing retail location theory is dominated by models which attempt to assess the attraction potential of existing shopping centres; an approach that may be referred to as a supply approach. However, the model constructed in chapter five of this thesis adopts a demand approach which focuses attention on households rather than on existing shopping centres and suggests the important characteristics of household members which influence the selection of retailing centres. This is achieved by utilizing concepts developed by sociologists and psychologists which are discussed in chapter four. Even though the demand approach differs considerably from most existing retail location theory it is considered necessary to extensively review existing theory (chapter three) so that justification for the demand approach may be presented.

The remainder of the thesis, chapter six onwards, is concerned with establishing relationships between certain types of shoppers, grouped according to the degree of constraints imposed upon them, and the usage patterns of various types of shopping centres. Significant relationships would provide grounds for accepting the validity of the theoretical model.

CHAPTER 2

THE STRUCTURE OF RETAILING IN BRITAIN.

Over the last half century retailing in Britain has undergone many dramatic changes. The retailers, manufacturers, wholesalers, planners, consumers, governments and prevailing economic conditions have all played a part in bringing about changes in retailing methods, changes in retail organisations, and changes in usage patterns of various types of shopping centres.

The most noticeable change in retailing methods has been the widespread adoption of the principle of self service. Introduced by the supermarkets this retailing method reduced personnel costs and allowed merchandise to be offered for sale at the lower prices consumers had been demanding.

The change in retail organisations that merits recognition has been the development of multiples. Defined as organisations having ten or more outlets, multiples have grown at an impressive rate over the past twenty years and accounted for 38.7% (Gower 1976) of total retail trade in 1974. This success was due to bulk buying, low operating costs (adopted self service quickly, standardisation of packaging of goods and processing, and computerization of stock checks and orders) and, in the early days, specialization of products. All these factors enabled the multiples to offer goods at prices which were lower than those offered by existing forms of retailing. The multiples, having grown from strength to strength, have been able to dictate terms to manufacturers and in some cases have even moved into manufacturing for themselves, thereby securing their channels of supply.

The usage patterns of various types of shopping centres is of primary concern to this chapter. It is proposed to look in detail at each of the available shopping centres.

A. Local Shops.

These facilities are generally small independently owned outlets
found either on their own or with only a small number of complementary
shops. They are sited in positions of maximum convenience to a small
number of potential customers. The share of total retail trade
accounted for by independent traders has been steadily declining;
in 1961 the share was 54%, in 1966 it stood at 49%, and in 1974 it
had fallen to 44% (Gower 1976). Their major disadvantage to the
customer is the relatively high prices charged for their merchandise.
This results because of their small scale operation which prevents
them from benefiting from the scale economics open to their larger
competitors. However, to a certain extent this disadvantage is
being slowly eroded due to increasing membership of voluntary chains
and groups. These organisations are collections of independent
retailers joined together for the purpose of conducting centralized
buying. This centralized buying is successful because each of the
members agrees to accept certain predetermined quantities of
merchandise. Therefore, these chains and groups are able to approach
manufacturers to demand bulk supply, thereby securing better terms.
As members of these voluntary collections the local stores are in a
better position to compete with urban and suburban supermarkets on the
basis of price.

The 'Future Pattern of Shopping' (Economic Development Committee
1971) paints a gloomy picture for the future of this form of retailing.
"The increase in market share held by the multiples was seen by
respondents to the questions as being largely at the expense of
independent traders, whose share was anticipated to fall to 41% by
1975 with a further drop by 1980."

According to the 'Future Pattern of Shopping' customers would use multiples rather than local independent stores because their improved mobility enabled them to take advantage of the 'better' shopping facilities offered by multiples. In contrast, J. Tanburn of Lintas Special Projects, as quoted in Retail Business (Economic Intelligence Unit 1973), does give the small independents hope in the long term but only if they get over the hurdle of the present economic situation. "The combined effects of S.E.T., the credit squeeze and high rents in new properties are making conditions extremely difficult for the small operator ... Shop numbers will fall considerably ... The independent shopkeeper will have a place in the seventies if he is both efficient and provides products or services which meet the needs of a sufficient number of people in the locality."

Unfortunately, both these views are too general. Lady Hall makes an interesting contribution in this respect by distinguishing between small shops (turnover around £50,00 p.a.) and very small shops (turnover less than £20,000 p.a.). Lady Hall sees a gloomy future for the very small shops but suggests that the small shops will survive. She sees the contraction in the numbers of independents as "the result of much larger gross flows, not only of small traders into and out of retailing but of the development of smaller retailers into larger ones. "(Economic Intelligence Unit 1973)"

At this juncture it would be useful to look at the experience of local stores in America. S. Hollander (1973) reports a resurging interest in the small convenience store organised under a franchising arrangement. "Prices are somewhat higher than in competitive supermarkets but the customer response indicates that at least some people are still willing to pay a premium at times, for convenience, service, and a degree of personalisation."

In this country, P. Lewis (1973) organised a successful collection of neighbourhood stores backed by a resourceful company. The aim was to offer services to the customer at a price. All the stores were modernised, staff wore the same uniforms, a delivery service was offered, a credit card system was operated, emphasis was on a friendly atmosphere and the company embarked on a campaign of price orientated promotions to reassure the housewife that she was not wasting the family income by shopping at the small local store. Although Lewis' own operation was successful he is pessimistic about the short run. "In inflationary times, everyones obsession with price turns operators' minds to that area alone and improved efficiency - more traffic, faster flow, quicker processing - all help make a store price competitive." However in the long run Lewis thinks that offering services will be successful; "If only because customers will rebel against current trends and demand to be treated as people." This opinion raises an interesting point which Jan de Somogyi (1974) discusses. He compares large retail outlets with large manufacturing industries. Industry is suffering from problems of operating on a large scale. The impersonal environment is leading to bad worker cooperation, which employers are at present struggling to remedy. Somogyi notes that retailing has been subjected to productivity gains which have led to the development of larger outlets... "While improvements in productivity along these lines must continue, care should be taken not to reproduce for the shopper, the staff, and the community, the impersonal conditions, boredom and dismal physical environment which industry is now trying to remedy." If one looks at retailing from this human angle then a bright future is suggested for the small shops.

On balance most writers predict a difficult short term future for the local stores (Economic Development Committee 1971; Gower 1971-2, 1973-4; Hill 1966; Stacey and Wilson 1961). Their long term survival is more encouraging and is likely to depend upon their relative advantage of convenient location, on their personal service, and above all, on their membership of voluntary chains and groups.

B.   Shops in Villages and Small Towns.

Up to 1980 the share of retail trade accounted for by shops in villages and small towns is seen by the E.D.C. (1971) as unlikely to change; this being the resultant effect of various forces acting in opposing directions. The forces tending to encourage this form of trade are: the tendency for people to live in the country in both first and second homes, people living longer and retiring earlier and spending their retirement in the country, and increased transport costs deterring people from visiting nearby shopping centres. Among those forces discouraging trade are the increased car usage making nearby shopping centres more accessible, and the tendency for country born people to move to the cities to secure better job opportunities.

C.   Central Shopping Areas (Medium - Large Cities)

The city centre has traditionally been the nucleus for all shopping activities, its function being to offer a wide variety of goods which are accessible to a very large number of people. The shopping facilities in the city centre form part of its activity profile. The prominent traders in the city are clothing shops, footwear shops, specialist traders, department stores and variety stores. Generally the city centre, although the largest individual shopping centre, does not account for the largest proportion of retail trade of the total city (total city comprising the centre and surrounding districts).

A typical breakdown is depicted by the following table containing data relating to Birmingham in 1961:

Total City Turnover accounted for by different categories of shopping centres.

City Centre Shops	25%
District Shopping Centres	22
Sub-District Shopping Centres	8
Local Shops	45

(Birmingham City Council 1973)

Much planning effort is directed towards preserving the city centre as the traditional nucleus for shopping. This involves the adoption of pedestrianisation schemes, an improvement of public transport facilities including the provision of bus lanes, and the linking of private and public transport by providing peripheral car parks serviced by regular buses.

Together with planners' attitudes, the fact that consumers value the availability of choice offered in the city centre suggests that the city centre is unlikely to radically change its share of total retail trade[1]. Figures for Birmingham support this view, for between 1961 and 1966 the percentage share of retail trade for the city centre fell by only one half a percent (Birmingham City Council 1973). However, it is important to note that the composition of that share is changing; there is a tendency for proportionately fewer food items and proportionately more non-food items to be purchased in the city centre.

Footnote.

1. This was also the opinion of the E.D.C. (1971).

D.   Suburban Shopping Centres.

Suburban centres comprise around 50 to 150 shops, providing a full range of convenience goods and generally including a choice of supermarkets. These centres are selected as one of the areas likely to increase their volume of retail trade in the future (E.D.C. 1971). The reasoning behind this opinion stems from the changing size of cities; "A characteristic of urban areas is that the larger the population the greater the proportion of retail trade which is carried on outside the central shopping area. The main reason for this is that as an urban area expands the central shopping area becomes relatively less accessible to shoppers and local shopping centres develop to meet the demand for convenience goods. In addition, as an urban area expands the increasing population provides the economic support for shopping centres outside the central area." (Birmingham City Council 1973).

Most new large residential developments in suburban areas include the provision of a shopping centre, the designs of which are intended to create pleasant shopping environments by isolating the motor car and providing adequate parking facilities within short walking distances.

Suburban centres rely heavily on the car shopper. On working days the catchment areas of these centres are especially small due to bad public transport facilities, but on Saturdays the catchment areas increase because of the increased availability of the motor car for shopping on this day. Gantvoort (1954), in a comparison survey of a shopping centre and town centre in France, found a predominant use of cars at the shopping centre. "On a working day as well as on a Saturday the proportions of persons travelling by car to the shopping centre was almost twice as large as that to the town centre."

In Britain at the present time, as in Europe, the role of the suburban centre is complementary to the city centre (Gantvoort 1954) (suburban centre confining itself to convenience goods, the city centre specializing in comparison goods), but the Europeans are developing these suburban centres further. De Bolt (1973) shows that the planners in Belgium are moving towards 'integral planning' - integration with the community. They are showing ways of integrating the commercial function into the habitat by providing common transport, leisure facilities, exhibitions, orchestras, choirs etc. Perhaps if such development is replicated in this country then the larger suburban centres may take on a different role in competition with the city centre. Such a move may further encourage the present growth of trade in these centres.

E. Regional Shopping Centres.

Many of Britain's large cities could be classified as existing regional shopping centres. Birmingham, Bristol, Cardiff, London, Norwich, Nottingham, Liverpool and Manchester are all cities with large shopping centres frequented by people other than the residents of the local catchment area. Shops found in such centres include department stores, variety stores, chain stores selling clothing and footwear, furniture and household goods, specialist shops, and so on.

Britain does not have any new regional shopping centres. An unsuccessful attempt was made in 1964 to obtain planning permission to build a regional shopping centre at Haydock, a site close to Liverpool and Manchester (Manchester University 1963). Permission to build the centre was not given on several grounds.

Its expected adverse effects on the traders in the surrounding areas, its undesirable erosion of the designated green belt,   its expected overload to the existing road system,   and its total disregard for non car shoppers were among the reasons given.

In assessing the future for new regional shopping centres it would be useful to look at the reasons for the success of out-of-town centres in America and consider their relevance for Britain (Mills 1974; E.D.C. 1971; Manchester University 1963), they are:

(i)   Increased prosperity has led to increased levels of retail sales.

(ii)   Rising population has led to more people living in rural areas with living patterns tending towards low population density areas.

(iii)   With lower housing densities the use of public transport fell, and Americans placed a greater reliance on the private motor car for all trip purposes.

(iv)   U.S. planners have allowed the traditional city centres to decay.

All the above factors encouraged the growth of regional shopping centres in America. Britain has experienced similar conditions, especially rising wealth and suburbanisation, but they have not stimulated similar growth. The main reasons why regional centres have not developed in this country are as follows: Firstly, planners do not favour the growth of R.S.C.'s because they are committed to a policy of preserving the traditional city centre and are obliged to protect the interests of existing traders and less mobile members of society.

Secondly, population densities in Britain are much higher than those in America and cities are closer together because of the comparitive lack of land. These factors limit considerably the possible number of available sites. Thirdly, transport facilities differ to those in America. Public transport in Britain is a better service, car ownership is lower in Britain, car usage for shopping is still at very low levels in Britain, and the costs of private motoring in Britain are comparatively high. Finally, many city centres were redeveloped after the devastation caused by World War 2.

These conditions together with the precedent established in the 'Haydock' decision suggest an unsuccessful future for new out of town regional shopping centres in Britain.

F.   Superstores and Hypermarkets.

Superstores and hypermarkets have several factors in common including a wide range of food items, a wide variety of non-food items, self service operation, extensive adjacent car parking space and low prices. Unfortunately there are no universally accepted differences between these two types of shops (Cynog-Jones 1974; E.D.C. 1971; Gower 1971-2, 1973-4; Mills 1974). However a distinction is made here that rests on the different sizes of sales area and the precise location. Superstores are considered to have a sales area of between 20,000 and 50,000 square feet and to be located on the edges of towns or in the suburban areas of large towns. Hypermarkets are considered to have a sales area in excess of 50,000 square feet and to be located outside the boundaries of towns.

At present there is a considerable debate among British planners, retailers and developers concerning the future of superstores and hypermarkets. As far as hypermarkets are concerned, planners have shown a reluctance to grant building permission for developments of large scale out-of-town shopping stores. The reasons for this reluctance are similar to the reasons for rejecting planning permission to build regional shopping centres. But unlike new regional shopping centres there are a few new hypermarkets in existence in this country.

The Carrefour hypermarket at Caerphilly was the first to be opened (Sept. 1972) and as such has been the subject of much study (Cox 1975; Donaldsons 1973; Retail Outlets Research Unit 1972; Capel Cure Carden 1973). A few of the more important findings from some of these studies were, that 90% of all shoppers at Carrefour used a car (Donaldsons 1973), that those most likely to visit the hypermarket were aged between 30 and 50 and of lower middle or skilled working class backgrounds (R.O.R.U.1972) (indicating that those members of society most likely to benefit from the lower prices in the hypermarket, namely the elderly and the poor were least likely to visit the store), that lower prices was the dominant reason for 69% of shoppers using Carrefour in 1973 although this dropped to 53% in 1974 (Donaldsons 1973), and that the main products encouraging people to shop at Carrefour were food items which resulted in the number of food outlets within the catchment area falling by 6% per annum, a rate three times greater than the annual national decline (Donaldsons 1973). Some of these findings support the planners' reasons for refusing building permission while others dispute them. This suggests that planners cannot generalize their reasons for refusing permission to build hypermarkets, but that every case must be looked at individually.

It is likely that more hypermarkets will be built but only in very small numbers. It is clear that because of site limitation in the UK hypermarkets will never account for more than a very small proportion of total retail trade.

Rather than a growth in out-of-town hypermarkets Britain is more likely to experience a rapid growth in the number of superstores in edge-of-town locations. Mills(1974) refers to superstores as "the British compromise" between retailers and planners. "British retailers now seem to consider smaller scale developments in edge-of-town locations to be more appropriate than out-of-town centres or hypermarkets. Most of the recent applications for sites have come from the major British food chains seeking approval for sites of less than 50,000 square feet (Mills 1974) (see also Sainsbury 1973). An added deterrent to retailers and developers to submit planning applications for hypermarkets is that the Department of the Environment has decided to centrally investigate all applications for store developments over 50,000 sq. ft. rather than leave the investigations to the relevant local planning authorities. This in itself will encourage the growth of superstores.

The current economic situation may also assist in the development of this type of discount trading. Britain's preoccupation with the control of inflation could force interested parties to pressurize planning authorities to pass applications for superstores. The Government's present economic policies are resulting in a squeeze of retailer's margins which is operating to the disadvantage of traditional retailers and to the benefit of large-scale discounters. Finally, existing superstores, such as Asda, Kwiksave, and Carrefour, have produced better results in terms of sales and profit growth than other forms of retailing, so investment is likely to flow in this direction.

G.   Off-Centre Specialist Stores.

The main distinction made between hypermarkets or superstores
and off-centre specialist stores is on the basis of the range of products
offered for sale. The latter's range of products is very limited and
generally falls within the durable goods' classification. The low cost
site with ample car parking facilities is of primary concern to this
discounter, relying on a reputation for low prices to act as a magnet on
customers. This policy is successful because people are now less
suspicious of cut price durables and are also prepared to travel much
further for durable goods than they are for food items.

The planners' attitudes towards this form of trading are favourable.
The E.D.C. (1971) stated, "The feeling is that they don't really compete
with town centres - and the reaction of local authorities, after
initial doubt, seems to be that they are to be welcomed."

The attitudes of the planners and customers and the current economic
situation, are all factors that are likely to add to the already promising
growth of off-centre specialist stores.

H.   Conclusions.

The most important developments in the structure of retailing
are occurring at out and edge of town locations. Planners are slowly
beginning to realize that a policy of preservation of traditional town
centres will not allow an 'ideal' provision of shopping facilities to
exist. Also it is likely that retailers will continually strive to seek
more efficient operating conditions and an out/edge of town location
provides an obvious way to meet this objective in view of residential
dispersal and accesssibility problems in traditional city centres.

It is a possibility that eventually the existing suburban shopping centres will adopt the principle of superstores and be located on the edge of towns because existing suburban centres may become the victims of congestion like the city centres before. Alternatively, the new superstores that are already in edge of town locations may begin to encourage the construction of other retail outlets on the same sites.

CHAPTER 3

LOCATING RETAIL OUTLETS

A.   Theoritical Models.

a) Central Place Theory.

'Central Place Theory' as first proposed by Christaller (1933) and later by Losch (1940) is concerned with the relative sizes and geographic locations of shopping centres at a regional and national level. The theory puts forward an explanation for the existing geographical pattern of shopping centres by classifying all centres into a hierarchy. The position of a centre in the hierarchy is determined according to one or more of the following criteria: the range of goods/services offered for sale (the most important), the shopping floorspace, retail sales, and the number of retail outlets (these are the favourite criteria). In practice a hierarchy would be structured in ascending order from villages through towns and small cities to regional capitals.

A basic postulate of the theory is that a certain good/service will only be offered for sale in those centres which are surrounded by a population (trade area) of a sufficient size to economically support a particular business operation. This suggests that different types of goods require differently sized supporting populations. Goods that are purchased frequently (convenience goods) require only a small supporting population and goods that are purchased infrequently (shopping goods) require a much larger supporting population. Therefore, small villages will only have a very limited variety of products but a regional capital will carry a full range of all merchandise.

The theory further suggests that because consumers patronize the nearest centre selling the commodity they require, then centres will be spatially structured into a honeycomb design comprising interlocking hexagonal trade areas. Such a spatial structure involves the location of a small city at the midpoint between three regional centres, the location of a town at the mid-point between three small cities, and so on.

This wide level analysis of retail location which attempts to rank the clusters of retail and service outlets has been the subject of much criticism. Without elaborating, the criticism has mainly been centred around the doubtful axiom that customers are orientated to a particular shopping centre only because it is the nearest centre that sells the specific merchandise the consumer wishes to purchase (e.g. Golledge 1966). But distance is certainly not the only factor that determines where a person shops. Bucklin (1966), among others, suggests that there are in fact several statistically significant factors affecting a consumer's choice of centre, such as mode of transport, number of shopping stops, income, race, price , variety of products offered, advertising, past experience, recommendation by others and so on. With the 'closest centre' axiom in doubt the whole basis of constructing trade areas around centres selling certain products must also be in doubt. Further criticism of central place theory is concerned with the criteria used to rank centres into a hierarchy (Davies 1970). However, by using some measure of trade mix the theory has introduced an important economic constraint to the location of retail outlets. In order that outlets can offer for sale certain products the surrounding population must be of an adequate size to support the business. This partly explains why certain products are sold in certain centres. Nevertheless, due to the increasing complexity of the structure of retailing the theory of central places has gradually become less relevant to the analysis of retail location........

"Changes taking place in retailing are seen to discourage highly concentrated centres in a step-like hierarchy with clearly definable functional differences between centres." (E.D.C.1970) The changes referred to are mainly the development of both suburban shopping centres and out-of-town shopping facilities.

b) Gravity Models.

Gravity models have been derived directly from 'Newton's Laws of Gravitation.' The analogy being that just as the earth's core attracts particles in the atmosphere, so shopping centres act as magnets by attracting people living in their vicinity. Also, as the planets in our solar system are finely held in position by their respective attractive power on each other, so geographically dispersed shopping centres are likewise finely balanced in position by their respective supporting populations.

The general structure of gravity models depicts a trade-off between those factors which attract people to a particular shopping centre and those factors which deter people from visiting a centre. This simple trade off in itself is no great innovation, for virtually all behaviour may be reduced to a trade-off between factors which encourage and factors which discourage a certain action, but such is the basic philosophy behind retail gravity models. Nevertheless the value, if any, of these models lies in the explanations they give to the attraction and the deterrent factors.

One of the earliest and more significant contributions in this field was made by W. Reilly (1931) with subsequent modifications by P. Converse (1949).

Reilly's so called 'law' was the result of a three year empirical
investigation designed to study the shopping patterns of persons
living in the vicinity of two large cities. Reilly found that the
number of people who were attracted to one of these cities was an
increasing function of the size of that city (as measured by its
population), a decreasing function of the distance necessary to
travel to that city, and a decreasing function of the size of the
other city. By transforming these functions into a mathematical
expression Reilly was able to assess how retail trade would be split
between the two cities under investigation. More specifically,
"two cities attract retail trade from any intermediate city or town
in the vicinity of the breaking point approximately in direct proportion
to the population of the two cities and in inverse proportion to the
square of the distances from these two cities to the intermediate town."
(Reilly 1931). Reilly's 'law' applied to all retail goods even though
he noticed that people were generally prepared to travel different
distances for certain goods (this fact was shown by different values
of the exponent in the formula, the square of distance used was an
average value of the exponents). Converse derived many variants of
Reilly's basic formula but at no time did he differ from the basic
attraction variable of population and the basic deterrent variable of
distance. Converse's main contribution was in the application of Reilly's
formula to designating trade areas around cities (breaking point formula).
Also, Converse restricted the use of the formulas to style and fashion
goods because he found that the distances people were prepared to travel
were significantly different for shopping and speciality goods as
opposed to convenience goods.

When considering the total contribution of these two researchers there are several factors which need to be discussed. Reilly's use of population was as a proxy variable for a whole range of other variables that Reilly suggested would be important factors in attracting people to a centre, namely: lines of transportation, lines of communication, the class of consumer in the territory surrounding the market, density of population in the territory surrounding the market, proximity of the market to a larger city market, the business attractions of the city, the social and amusement attractions of the city, the nature of the competition offered by smaller cities and towns in the surrounding territory, the perception of distance, the topographical and climatic conditions peculiar to the city, and the kind of leadership offered by the owners or managers of various business interests of the city. This is a fairly exhaustive list but by no means complete. It seems strange that the single variable of population should fully explain the effects of such an array of factors. However, if population is an adequate proxy then Reilly's 'law' is, for the practicing marketer, a cheap and easy to apply tool for determining trade areas. This is a potentially important advantage for any model.

Another point that must be emphasized is that the model is deterministic. But human behaviour is seldom the result of a known set of predetermined conditions. There are many factors that influence behaviour, some more important than others. Even the relative importance of variables will differ between individuals and between situations. Because of this, human behaviour is less predictable than a deterministic model would suggest.

Further, the model so far discussed is based on the assumption of a closed system. This means that the boundaries of influence are known (i.e. towns and cities not included in the model are assumed to have no influence). This assumption severely restricts the applicability of the model. However, neither Reilly nor Converse intended that the model be used for any situation other than to assess how retail trade, of a selected group of goods, was divided between two relatively large cities situated in a rural area.

Criticisms aside, two tests of Reilly's law by Converse produced favourable results, but tests by R. Reynolds (1953) and others have proved to be indecisive; Schwartz (1963) concludes, "While the various tests of Reilly's law do not offer evidence leading to a rejection of the law, the available information does not permit a conclusive judgement as to the law's accuracy." Therefore, Reilly's evidence has provided only a guide rather than a law, and even then a guide which does not have general applicability.

All subsequent work on gravity models has a direct connection with Reilly's contribution and has tended to concentrate on deriving better variables to explain why people are attracted to a particular shopping area. So far the attraction variables have defied exact definition, nevertheless, it will be useful to discuss some that have been suggested. Reilly's use of population as the attraction variable was soon replaced because it became evident that better shopping facilities were not necessarily associated with larger towns. Therefore, there was no significant correlation between the number of people being attracted to a town and the size of its population. This led researchers to replace population with the 'number of shops' as the attraction variable.

This new variable remained in vogue during the thirties and forties but as the trend toward larger and more efficient shops became established so the significance of this variable declined. What happened was that some towns were reducing their absolute number of shops but at the same time they were increasing their attractiveness. Such activities meant that the number of shops was an insignificant proxy for the attractiveness of a town. The natural progression from this variable was to use a measure of sales floor area as the attraction variable but unfortunately this variable says nothing about the quality of retailing nor anything about the range and mix of products being offered. Also, floorspace is very insensitive to external changes which may affect the attractive power of a town. For example, " .. the floorspace provision may remain constant through a period of declining sales due to population redistribution" (E.D.C. 1970). The variables that are at present the commonly accepted proxy variables for attraction are based on sales criteria, total retail sales, central area sales, or central area durable goods sales. Many contemporary researchers have suggested that sales criteria are superior to other measures of attraction (e.g. Thorpe and Rhodes 1966). However, it must be emphasized that sales criteria measure the actual trade attracted to a town and therefore they are not measures of attraction potential. Nevertheless, Davies (1970) has proposed the superiority of sales criteria because they may be applied over all levels of enquiry, ranging from local to national systems. According to Davies, wide application is an advantage which also favours the use of another proxy for attraction, namely, the number of people employed in retailing. But such a variable would prove unstable over time because of the changing internal structures of retail units which are constantly aiming for increases in sales per employee. Therefore, reductions in retail staff could mean either reductions or increases in attraction.

Other measures of attraction have been based on either a selected
range of services or the number and mix of selected stores that a town
offers. These measures are severely restricted in their application
for they have invariably been constructed to suit a particular situation.
Examples of some of these measures will be briefly discussed later in
this chapter.

Deterrent variables in comparison to attraction variables, have
not been the subject of so much discussion. In this case there appears
to be more agreement on the variables which are used. The earliest
variable, as used by Reilly, was 'actual road distance.' Subsequent
variables have utilized two other derivatives of distance; road distance
by mode of transport, and the simple airline distance. If one is to
choose distance as the deterrent variable then there is much to recommend
the use of the simple airline distance, for at least one writer
(Lowry 1964) has suggested that there is not much to be gained by using
either of the other more complicated measures. However, there are
arguments against the use of any form of distance as the deterrent
variable. First, the importance of distance is greatly reduced for
location decisions within an urban area because of the greater variety
of shopping opportunities that are available. Therefore, if at all
important its use is restricted to rural areas. Secondly, distance
takes no account of potentially important factors such as traffic
congestion, frequency or price of public transport, variations in car
ownership, and so on; "In any application in the real world it is
difficult to believe that distance could be the only relevant spatial
measure of flows." (Curry 1972).

More recently, attention has been focused on the use of some form
of travel time to act as the deterrent variable...."In theory it is
clearly more satisfactory to use time or some function of time and
travelling costs." (E.D.C. 1970). Such a function of time would take
the form of journey time by mode of transport, a complex measure.
However, the E.D.C. for the Distributive Trades (1970) notes that
empirical evidence depicts a close correlation between journey time
and airline distance, therefore, in the interests of simplicity
apparently very little is to be lost by favouring the use of airline
distance as the deterrent variable.[1]

Perhaps the next most notable stage in the development of gravity
models occurred during the post war period and was provided by D. Huff(1963).
What Huff did was to build a model around the notion that as each
consumer was attracted in varying degrees to all shopping centres then
the probability of a particular consumer visiting a particular shopping
centre could be calculated. In other words, all shopping centres have
a possibility of being visited by each and every consumer. In contrast
the deterministic approach established a dividing line between two centres;
those living on one side of the line would visit one of the shopping
centres and those on the other side would visit the other centre, nobody
would cross the line. However, the Huff approach constructs contour
lines around a shopping centre each representing the various levels of
probability of attracting consumers living in those areas. In practice
the model is separately applied to all residential areas and a value of
the probability of visiting each centre is calculated.

Footnote 1.

This applies to regional levels of enquiry and not to location
decisions within an urban area.

A major advantage of this probabilistic approach is that the model is not restricted to an analysis between only two centres, for it may be applied to an area that contains many shopping centres. But because the boundaries of the model must be predetermined then the simplifying assumption of a closed system must prevail. Also, in calculating his probability values, Huff resorts to familiar territory by interpreting the attraction variable in terms of square footage of selling space and the deterrent variable in terms of travel time. In his formula, Huff accounts for the willingness of consumers to travel greater distances for certain commodities by applying different values to the exponent on the 'travel time' variable.

In retrospect Huff's major contribution to retail location theory is as Thompson (1966) suggests, "his application of a probabilistic notion allowing for non-uniqueness and variance in consumer shopping patterns."

Within the sphere of gravity models the two main approaches have now been covered; deterministic and probabilistic. There have been other gravity models but none have developed such a significant variation on the original deterministic approach as Huff's model of probabilistic behaviour succeeded in doing. Other probabilistic models differ only marginally from Huff's model, the difference being mainly in their mathematical formulation. One such variation is the Lakshmanan-Hansen model (1965) which was designed to be applied to the location of satellite shopping centres around a major city. This model is restricted to shopping goods trade and similarly suffers from the assumption of a closed system. Lakshmanan and Hansen intended that the attraction variable of the model should be floorspace and the deterrent variable should be travel time. However, a practical application of this model, the Haydock Study Part 2 (Manchester Univ. 1966), substituted the attraction variable for an interesting multiple index.

This index comprised, Attraction = $2V + 3D + C + M$, where V = the number of variety stores, D = the number of department stores, C = the number of chain stores, and M = the number of markets. It was suggested that this attraction variable was more plausible because it included those factors which were more likely to be considered by the individual in deciding where to shop. The E.D.C. (1970) points out the limitation in that "the measure does create difficulties for prediction since it is difficult to know what kind of trade mix to expect in a new centre. In this respect, floorspace is preferable since development proposals are usually expressed in terms of square feet."

A further model, as applied by Rhodes and Whitaker (1967) to the London Borough of Lewisham, also used the basic framework of the Lakshmanan and Hansen model but differed in the interpretation of the attraction and deterrent variables. Retail sales and straight line distance were used respectively. But the main difference of the so called Lewisham model from the models previously discussed was its account of an open system. This was achieved by acknowledging that a certain amount of trade would be drawn from the study area to the nearby central London areas. An estimate of this volume of trade was based on a sample survey of shoppers in the study area and was discounted from the model.

The final approach to be discussed in this section is referred to as the intervening opportunities approach (Cordey-Hayes 1968). Rather than some variant of distance the intervening opportunities approach interprets the deterrent variable in terms of the number of shopping facilities which are located between the shopping centre under investigation and the consumer's residence (i.e. the intervening opportunities to shop).

It is hypothesized that the more shopping opportunities a person must pass on route to a particular shopping centre then the greater that person will be deterred from visiting the centre. The opposing force, the attraction factor, is the number of shopping opportunities available at the shopping centre under investigation. This approach shows an improvement on the ways in which previous models have interpreted the deterrent variable. An improvement in the sense that the very general variables of distance and travel time have been substituted for a variable which reflects an improved understanding of consumer behaviour. But as with most other models, this is undoubtedly not a full explanation of the factors that influence where a person shops.

B. Locating Individual Outlets Within an Existing Shopping Centre.

At this very detailed level of analysis there are no models that may be readily applied. For the practitioner this situation has created a very imprecise state of affairs. The result is that he must rely on his own experience to assess the viability of potential sites. However, the practitioner does have at his disposal a whole range of indicators to which he can refer. These indicators are merely guides which must be interpreted subjectively because their influence and applicability will vary greatly between different location decisions. Cohen and Applebaum (1960) have suggested the following four areas that need to be thoroughly investigated before any location decision is taken. They are accessibility of site, population within the trade area, competition, and economic stability.

Accessibility in this context refers to a very detailed evaluation of how easily the site may be reached. In practice, this could involve checking the site's relative proximity to arrival points (car parks and bus stops) and pedestrian flows, checking what physical obstacles shoppers need to overcome in order to visit the site, and checking whether the proposed site is more accessible than the established outlets of competitors. Certain characteristics of the population living within the trade area could also prove to be valuable indicators (e.g. absolute size, composition, density, growth, income, expenditures etc.). Finally, before establishing a retail outlet one needs to assess both the possible effects of competition within the trade area and the prevailing economic situation. Site location will depend on these factors and the retailer's policies to deal with them.

To complete this section it is necessary to mention a method suggested by Applebaum (1966) that provides a more scientific approach. The method involves building up a log of empirical measurements of store sales in relation to store characteristics, market factors, and consumer shopping behaviour patterns. Such measurements are obtained for a number of similar situations on the grounds that "similar stores and similar market factors make for approximately analogous situations" (Applebaum 1966). Therefore, these measurements become 'analogs', benchmarks for reference. By using these analogs as measurement standards to estimate potential store sales prospective retail sites may be assessed. Unfortunately, there is a drawback to this method that places it in a similar category to the approach already discussed in this section.

No two situations will be identical so when applying these analogs to similar situations a certain degree of subjective judgement is required. Nevertheless, this type of approach is undoubtedly used in practice especially by the larger chain store organisations.

C. Conclusions.

There is one very important observation that must be made about this review of the models of retail location. It is that the models have evolved without any reference to the established theory of consumer behaviour. If the location of retailing facilities is conceived of as an equilibrium balance between the supply of outlets and the demand for outlets, then it is fair to state that the supply side has been well researched but the demand side relatively ignored. In other words, the study of retail location has focused on approaches which aim to supply both an adequate and an ideal combination of retail facilities to respective locations. This preoccupation of researchers with the supply side of the relationship has undoubtedly placed the wedge between the theories of consumer behaviour and retail location. It has been suggested that people do not base their decisions to shop in certain locations on the kinds of variables which the model builders have so far used (E.D.C.1970; Huff 1962). If this is so then the theoretical basis of retail location theory is very unsound. The emphasis on supply has resulted in an approach which takes an existing conglomeration of shopping centres and attempts to assess how retail trade is distributed between them. This assumes that the existing centres represent an ideal selection as far as the consumer is concerned. Such an assumption is probably unsound because in practice the consumer must choose an existing centre which best suits his/her conditions and requirements.

An attempt to assess these conditions and requirements may prove
more profitable and may be achieved by focusing on the demand side
of the relationship. Firstly, such an assessment would involve
utilizing constructs developed within the theory of consumer behaviour
such as consumer attitudes, perceptions, personality characteristics,
social groups, and/or stages in the family life cycle (these concepts
will be reviewed in the next chapter). Secondly, the demand approach
would distinguish between consumers on the basis of their ability to
visit certain shopping centres. This refers to the availability of
transportation and raises the controversial issue of the use of the
private motor car for shopping. But in this context it is important
to note that the range of shopping centres that may practically be
visited will differ between users and non users of motor cars. Finally,
the demand approach to retail location would show an awareness of the
influence of activities other than shopping in which the household
members are involved (This will be more fully discussed in Chapter 5).

In addition to this significant criticism there exists a further
deficiency of existing retail location theory. This refers not so much
to the theoretical basis of the models but more to their practical
applicability. In Chapter two it was observed that there was currently
little or no retail development at the regional level (unlikely to be
any new regional shopping centres, even many new towns). This situation
will place much of the current retail location theory in a redundant
position because the theory has only showed any successful application
at this regional level. All the structural activity in retailing is
likely to be happening in and around large urban areas because in such
circumstances both the population size and the distances involved are
large enough to enable a variety of alternative retailing facilities to
develop.

It is interesting to note that at this level of analysis food products become the most significant commodity for attracting people to a particular shopping centre. This fact further places existing theory in a redundant position because its application is more suited to shopping/durable goods.

What then is needed is a model of retail location capable of determining the shopping centres that people will select from a variety of centres in and around a large urban area. The model would be mainly applicable to the purchases of frequently consumed items such as food--type products. Finally the model should utilize constructs developed within the theory of consumer behaviour so as to focus attention on the demand for rather than the supply of retail outlets.

CHAPTER 4

AN APPRAISAL OF THE MORE IMPORTANT SEGMENTATION VARIABLES DERIVED FROM CONSUMER BEHAVIOUR THEORY.

A.   Introduction.

The formal study of consumers is a relatively new discipline.
At present consumer behaviour theory utilizes contributions from
Economics, Psychology, Sociology and Anthropology. Many theoretical
models have been developed that attempt to explain the connections
between the various constructs put forward by each of these disciplines
(For example: Engel, Kollat, Blackwell 1968, 1973; Howard, Sheth 1969;
Engel 1968; McNeal 1973; Markin 1974; Nicosia 1966). The common feature
of most models is the multivariable influence on behaviour; "Consumer
behaviour is seldom the single result of anything, whether it be
attitudes, communication, personality, social class, or the impact of
culture." .... "consumer behaviour is the result of a host of
complex interacting and interdependent variables." (Markin 1974).
However, for any particular situation a certain variable may be a more
important determinant of behaviour than any of the others, but
nevertheless it must be stressed that any particular variable operates
within the framework of a whole host of additional variables.

The practical approach to understanding behaviour is to refer to
aggregates of consumers which are selected on the basis of one or a
limited number of independent variables which are relatively easy to
measure. This procedure is known as market segmentation. There are
various ways in which markets may be segmented but in this chapter it
is intended to concentrate on segmentation variables that have a direct
influence on behaviour. The purpose of this is to explore the possibility
of utilizing those variables that would facilitate the development of a
demand approach to retail location theory.

B.   Social Class.

One way of segmenting a market is to use social classes. In
society there is a tendency for individuals and families to rank
themselves against other members of society. In this way society
becomes stratified into groups comprising individuals and families
of a similar status in life. Such homogeneous groups are referred to
as social classes. Since there is only limited social contact between
members of different social classes these groups tend to develop their
own characteristic patterns of behaviour.

The vast majority of reported research that has applied the
concept of social classes to segment markets has either used Warner's
(Lloyd Warner 1960) six class model or some slight variation. Warner
categorized society into the following: upper upper class, lower upper
class, upper middle class, lower middle class, upper lower class and lower
class [1].

Given that social classes exist then the most important determinant
of an individual's social class membership is their occupation (the most
accurate single indicator). Other determinants used are income,
residential area, type of dwelling, ownership of property, education, and
possessions. Warner used a weighted multiple item index of occupation,
source of income, house type and dwelling area. But perhaps the usual
classifications are based on occupation of head of household, education,
place of residence and income.

Footnote 1.

In contrast some researchers and sociologists have challenged such
a sub division of society and have even challenged the existence of social
classes. These people suggest that society is better depicted as a
continuum rather than comprising a set of discrete classes (Lenski 1952).

The results of using social class to segment markets have proved to be varied. P. Martineau (1958) was a firm believer in the use of social classes;"there is a social class system operative in metropolitan markets, which can be isolated and described." Martineau felt that the things people bought were closely related to their class membership; "In a very real sense everyone of us in his consumption patterns and style of life shows an awareness that there is some kind of superiority – inferiority system operating, and that we must observe the symbolic patterns of our own class." (Martineau 1958). Martineau also saw both store choice and saving patterns as being closely related to social class. But Rich and Jain (1968), in contrast to Martineau, found little influence of social class on store patronage.

Another researcher, G. Nader (1969), using the type of dwelling (rented, and three categories of private) as the determinant of social classes, found variations in shopping patterns between social classes for purchases of shopping goods but found little variation in shopping patterns for convenience goods. The main finding made by Nader was that the higher the social class the greater was the percentage of shopping goods expenditure in regional shopping centres.

Mathews and Slocum (1969), investigating credit card usage found that members of different social classes exhibited different credit card usage patterns; "Higher social classes have a wider range of goods deemed acceptable to buy on credit. Similarly, these people appeared to have a more favourable attitude toward credit than members of the lower classes."

On balance these few research findings encourage the use of social classes to segment particular markets but it must be stressed that not all behaviour is class related.

There will be situations where social class will not be of any value in explaining the dependent variable. Also, the extent of influence that social class has on the dependent variable will differ between situations. A further warning in the use of social classes has been provided by Coleman (1960) who emphasized the within class variations caused by differences in the aspirations of class members. Within each class there are those who aspire to belong to the class above and those who aspire to belong to the class below. Such persons will behave like members of that group to which they aspire to belong, thereby causing within class variation.

A final consideration about the use of social classes is concerned with the importance of income as a segmentation variable. A controversy has arisen over the relative superiority of these two variables in determining behaviour patterns. The traditional view of social class superiority has recently been challenged by several researchers (for example, Rich and Jain 1968; Coleman 1960; Myers, stanton and Haug 1971; Wasson 1969; Slocum and Mathews 1970). Martineau (1958), taking the traditional view, saw social class as being a more significant determinant of a consumer's buying behaviour than just income. He felt that social class had a much richer dimension of meaning; "Consumption patterns operate as prestige symbols to define class membership, which is a more significant determinant of economic behaviour than mere income." Such a belief stemmed from a simple but yet an effective comparison of a rich man and a poor man; "A rich man is not a poor man with more money. Given more money the poor man would not behave the same as the rich man."

More recent writers still agree with Martineau (for example, Markin 1974) and Wasson (1969) even suggests that the changing structure of income differentials between occupational groups is causing the social class variable to strengthen its superiority;

"Whatever validity income classifications ever had was due to a rough and now disappearing correlation with occupational status." (Wasson 1969). Myers Stanton and Haug (1971), agree with Wasson that the social class variable has become more important because of the changing income differentials, but they consider that the income variable has maintained its position as the more significant determinant of buying behaviour. Rich and Jain (1968) view social class as the inferior variable and also suggest that its significance is declining for they believe that rising incomes and educational levels have obscured the social class distinction.

Many different views have been discussed and what is to be learnt from these disagreements is that the superiority of either of the two variables probably depends on the situation under investigation and that both of these variables should be taken into account in any segmentation programme.

C.   The Family Unit and Related Concepts.

When discussing the family unit as a basis for segmenting a market emphasis is on the nuclear family (parents and children) rather than the extended family (includes all blood relations).

Much purchasing behaviour is conducted on behalf of a family which means that certain products are intended for family consumption as opposed to consumption by an individual. In these cases the family unit may be an appropriate basis for segmentation.

A further basis for segmentation could be the size of a family (i.e. number of persons in the nuclear family). Although such a variable may suffer from limited application it may, in certain situations, provide a valuable explanation of variations in behaviour patterns.

Attention must now be focused on that variable which is perhaps the most important family related concept, the concept of the family life cycle. Families may be distinguished from one another by the various physical conditions which form the whole spectrum of stages a family passes through during its life span. Those stages that are distinguished and used as a basis for segmentation are generally determined when the roles of family members are significantly altered by the process of maturity. Normally families pass through three basic stages: first the pre-marriage stage (young persons living away from home), second, the marriage stage, and third, the solitary survivor stage. Additionally the second stage may be sub divided into at least four other distinguishable stages: newly married couples with no children, young married couples with dependent children (full nest 1), older married couples with dependent children (full nest 2), and older married couples with no dependent children (empty nest) (Wells and Gubar 1966).

In practice it has been noticed that the types of goods purchased depend to a certain extent on a family's position in the life cycle. An example quoted by Wells and Gubar referring to the purchase of furniture illustrates life cycle related behaviour; "During early stages of marriage, when the couple must acquire enough furniture to satisfy its basic living needs, the young family places greater emphasis on sensibility and practicality than on style and beauty," this suggests the tendency for young couples to select inexpensive furniture of sturdy quality. This example should not infer that life cycle related behaviour is confined to durable goods. Barton (1966) has suggested that purchases of non durables would be more sensitive to stages in the life cycle than purchases of durables because of the shorter life of non durables.

Unfortunately there does not appear to be much published research analysing life cycle related behaviour. However, two researchers, Rich and Jain (1968), did investigate this concept but contrary to most authorities on marketing they concluded that the life cycle was not a useful concept in understanding consumer behaviour. Rich and Jain reasoned that changing socio economic conditions had obscured any significant relationships that had previously existed.

Other published research about the life cycle has mainly been concerned with its relative explanatory power over age as a basis for segmentation. Obviously age categories may be used to segment markets (in fact it is a very commonly used variable), but because of the high correlation between stages in the life cycle and age a controversy has arisen over which variable it is best to use. Lansing and Kish (1957) found the life cycle a better explanatory variable than age, but Wells and Gubar (1966), offering a compromise solution to the controversy, noted that for some goods age proved to be the more explanatory variable while for others the life cycle was superior.

D.   Personality Variables.

The traditional superiority of demographic variables for segmenting markets is at present being challenged. The variables that are being offered as at least equally important to demographic variables are based on the personality characteristics of consumers. The personality of a consumer refers to a collection of constructs which determine individual behaviour such as motives, attitudes, characteristic modes of reacting and behaving (response traits), beliefs and values. It has been argued that segmentation based on personality variables offers a richer and fuller understanding of consumer behaviour (see Yankelovich 1964; McNeal 1973; Kassarjian and Robertson 1973).

Therefore it will be beneficial to discuss some of the personality measures that have been proposed and tested.

The work of two separate researchers who have attempted to gain a fuller understanding of store patronage by using personality variables is reported. First P. Martineau (1954) observed a relationship between the different types of retail outlets and the personalities of shoppers. He suggested a list of personality measures which were significant determinants of where a person shopped, namely; friendliness, excitement, glamour, enhancement of self image, and economics. Apparently Martineau did not follow up these ideas and more importantly he did not subject his observations to any empirical testing, therefore, his work must not be regarded as authoritative. However, the second researcher concerned with store patronage, G. Stone (1954), did approach the subject in a more rigorous manner. From his analysis, Stone classified urban shoppers according to their attitudes toward stores. With this approach he discovered that there were basically four categories into which all shoppers neatly fitted:

a) The economic shoppers, these people regarded shopping as primarily buying and appraised the store's merchandise in terms of price, quality, and variety;

b) The personalizing shoppers, these people viewed shopping more in terms of social interaction and stores were rated in terms of the relationships between the customer and store personnel;

c) The ethical shoppers, these people felt a moral obligation to patronize the small independents in order to safeguard them against the giant supermarkets;

d) The apathetic shoppers, these people had no interest in shopping and as such did not discriminate between stores.

Even assuming that these categories are adequate their use in isolation would be of little value as a basis for segmentation because of the likely heterogeneity of the segments (for example, personalizing shoppers may be widely dispersed geographically and as a result one would still not know where to locate small independent stores). One would assume that Stone appreciated this weakness because he took his analysis one stage further and linked his personality categories to the demographic variable of social class. From this analysis he found that ethical shoppers tended to have a high social status, apathetic and personalizing shoppers a low social status, and economic shoppers a middle social status. This combination of personality and demographic variables was more promising (to continue the previous example the following assumptions may be made: High correlations exist between social class and residential areas. Personalizing shoppers have been shown to come from lower social classes. Therefore, according to Stone, small independent shops may be better located in lower class residential areas).

Personality variables have been applied to situations other than store patronage and it is necessary to consider some of these other approaches to segmentation. McClelland (1961) considered that segmentation could be based on measures of the need to achieve success. In an empirical investigation McClelland found that men scoring high on a measure of 'need-achievement' tended to favour different products to men scoring low on the 'need achievement' measure. But an obvious disadvantage with this method of segmentation is the determination of a valid and reliable measure of the 'need-achievement' construct. Nevertheless, another researcher, Evans (1959), did in fact use this construct along with several other personality measures in an attempt to predict the sales of Ford and Chevrolet automobiles.

Unfortunately the attempt was unsuccessful and Evans concluded that personality variables were of little value in predicting automobile brand ownership. In fact Evans obtained more favourable results when he used only demographic variables.

Another approach to segmentation, based on personality variables, is provided by K. Horney (1950) who classified people according to the type of relationship they had with other people. Horney suggested that people were either 'complaint','aggressive,' or 'detached'. Complaint people wish to involve themselves with others and conform easily to group norms. Aggressive people want to achieve success and are prepared to go to great lengths to be noticed, other people being viewed as competitors. Detached people are very independent and distrustful of others. These classifications were used by J. Cohen (1967) in an attempt to relate them to product and brand usage but no definite relationship was found.

The final contribution to be discussed in this section is that of Riesman (1961). His theory claims that human beings can be classified into three groups according to their social character. The first group comprises 'tradition directed' persons. These are people who are oriented towards the past and are characterized by their dependence on family ties and a general slowness to change. The second group comprises 'inner-directed persons who rely totally on their own attitudes and values to direct their behaviour. The third group is in direct contrast to the second and contains 'other- directed' persons who rely on other people to give direction to their own behaviour. Two other researchers, Gruen (1960)and Kassarjian (1965) have separately attempted to apply Riesman's ideas but neither were successful.

Gruen failed to find any relationships with the preference for new products and Kassarjian failed with different types of advertising appeals.

To conclude this section on personality variables it would be fair to state that the evidence so far does not favour their use as a means for segmenting markets. In theory one's personality has much to do with one's behaviour and as a result it should be a fruitful area on which to base a segmentation programme. However, personality variables have proved to be very difficult to measure and much research needs to be directed at improving and deriving reliable and valid measures. Nevertheless, it must be emphasized that even when personality measures are improved there is an important criterion which they must fulfil before being applicable to any segmentation programme. "People with common personality dimensions must be homogeneous in terms of demographic factors such as age, income and location, so that they can be reached economically through the mass media." (Engel, Kollat and Blackwell 1973). This suggests that the future success of personality variables lies with those segmentation programmes based on a combination of both demographic and personality breakdowns. Such an approach may alleviate the possibility of obtaining groups of individuals which are heterogeneous in all other factors except a personality characteristic, hence satisfying the criterion above.

E.   Conclusions.

With the exception of personality constructs all of the other
variables discussed in this chapter have proved reasonably successful
at explaining differences in behaviour patterns. Therefore, it is likely
that they could be used in a model of retail location which adopts a
demand approach. Individually social class, age and personality constructs
have actually been used in studies of retail location. Only comparative
empirical tests of all possible variables would reveal the best variable
for distinguishing between patterns of retail selection behaviour. But
because consumer behaviourists have warned that behaviour is seldom the
result of a single independent variable then it would be better to
construct a model of retail location that takes account of the complex
interactions between all possible variables, the problem now arises as
to how this may be achieved.

In many situations a consumer is confronted not only with the
factors that directly influence behaviour which give rise to desired
behaviour, but also he/she is confronted with factors that act as
constraints on behaviour. The result being that the desired course of
action becomes adjusted in some way, that is, in mathematical form:
possible behaviour = f (desired behaviour + constraints).
Social class, income, age, family size and position in the family
life cycle all induce and constrain the behaviour of individuals.
But it is assumed that retail location selection decisions would be
influenced more by factors that constrain behaviour than by factors
that induce behaviour. Based on this assumption a behavioural model of
retail location will be constructed in the following chapter that utilizes
several demographic variables by incorporating their influence in terms of
how they constrain the behaviour of an individual. Constrained behaviour
is the single concept that will be used as a basis for segmentation.

CHAPTER 5

A MODEL OF RETAIL LOCATION.

Collectively the three previous chapters have established the basis along which a theoretical model of retail location should be developed. The model is intended to apply to location decisions within a large urban area and is primarily concerned with frequently purchased products (food items). It was suggested that a demand approach would be more relevant at this intermediate level of analysis and would involve utilizing constructs developed within the theory of consumer behaviour. Attention isto be focused on the way that 'desired' behaviour was modified by physical and behavioural constraints to produce a pattern of possible behaviour.

A. A Theoretical Model of Retail Location based on Constrained Behaviour.

a) Time Constraints.

Shopping for food is only one of a whole range of activities in which people are involved during their weekly routine. It is therefore likely that shopping behaviour patterns will be influenced by some or all of these other activities. This influence will restrict shopping behaviour by imposing time constraints on the shopper. The total time available for shopping during a week will be determined by the total time spent on other activities during the same period. But more important, this total available shopping time will comprise several time elements spread over the days of the week. The precise periods when these time elements occur will be determined by certain occasions in the day when the shopper must be engaged in some activity other than shopping. Such occasions may be referred to as 'time ties'. Therefore, for each shopper the complex structure of his/her activities establishes a variety of alternative time elements which may be devoted to the shopping act.

In practice the 'work status' of the shopper is likely to be a major source of time constraints. A shopper who is employed on a full-time basis is more constrained in his/her behaviour than a shopper who has no employment, providing of course that this is the only variation between the two shoppers. The former shopper will have fewer available time elements from which to choose to be engaged in shopping.

In addition to the shopper's personal circumstances it is likely that the primary activities of certain other people will impose time constraints on his/her behaviour. Not all people are 'food shoppers', but all are consumers of food. Generally food is purchased on behalf of a household unit by one or more of its members. Such (a) person(s) may be referred to as the household shopping agent(s). The individual members of the household have their respective roles to perform in society. To enable a household to function as a unit the activities which individual members are engaged in must be interactive and interdependent. Therefore all household members will play an important role in establishing the variety of time elements during which the shopping agent may be engaged in food shopping. For example, the employment status of the agent's spouse will impose time constraints which take the form of 'time ties'. This may result because an agent is forced to be at home every day during certain periods in order to prepare meals. Another significant source of time constraints exists because of the shopping agent's committments to those of her [1] children living in the same accommodation. Assuming that 'children status' is the only variable then agents who look after below-school-age children are by comparison more constrained than agents whose children are attending school. Obviously agents in either of these categories are more constrained than agents who do not have any children.

Footnote 1.

Hereafter the shopping agent is assumed to be female.

Figure 5.1 diagrammatically represents the part of the model that has so far been constructed.

FIG.5.1.
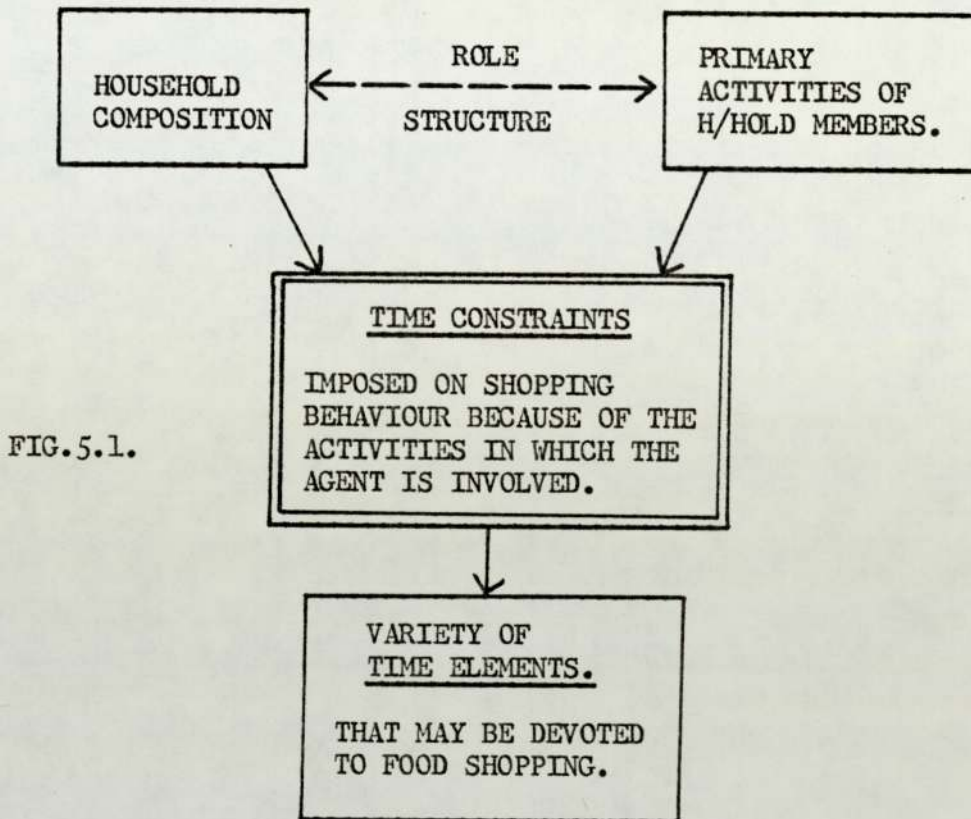
The composition of the household (the basic purchasing unit) will, when account has been taken of the activities of its members, establish a profile of activities for the household shopping agent. The more significant activities will be the work status of the adult members and the school status of the child members. These activities will impose time constraints on the household shopping agent which will present the agent with a variety of alternative time elements which may be devoted to food shopping. An important point to note at this stage is that it is likely that profiles of these time elements will be similar for households with the same composition because similar households will be involved in similar activities.

b)   Mobility Constraints.

An important factor in determining the selection of a retail outlet is the ability of the shopping agent to travel the distance between her home base and the shopping centre. This will depend on the speed at which the shopping agent is able to travel and on the time she has available on any one particular occasion. Speed may be interpreted in terms of a measure of mobility (ability to cover distance). Shopping agents will differ in their mobility levels (for example, some agents will have access to motor cars while others may only have access to public transport). An important consideration is that a particular shopping agent's mobility level may vary considerably throughout the week. In a household that possesses a motor car there may be times when the shopping agent's mobility level is severely reduced because the household car is not available for the agent's use during all shop opening hours (perhaps the agent's spouse uses the car for work). Alternatively, for the agent who does not drive a car, the mobility level may be increased during certain periods when she is able to team up with another household member who can drive. Both these situations may refer to a shopping agent's level of mobility and may be classified as 'restricted use of a motor car.' In contrast is the shopping agent who holds a driving licence and who has a motor car available for her personal use at all times during the day, she may be classified as having 'unrestricted use of a motor car.' Additional mobility levels may be derived for those agents who do not have access to a motor car by dividing public transport availability into 'good' and 'bad' categories. The criteria for such a division could be based on the frequency of service and the distance between the agent's house and the nearest bus stop.

Now if some quantitative measures could be applied to these levels of mobility then it would be theoretically possible to assess the distance that a particular shopping agent could travel in each of her available time elements. Distance boundaries could be calculated from the home base for each of the time elements by using the following mathematical formula:

$$\text{Distance able to travel from home during time element 1.} = \text{Mobility level during time element 1.} \times \frac{(\text{Length of time element 1} - \text{Time necessary for actual shopping})}{2*}$$

* To account for the return journey.

One of the time elements will produce a maximum possible distance that a particular agent is able to travel, a distance boundary beyond which shopping opportunities are physically unobtainable (providing both the agent's activity profile and mobility level remain unchanged). But calculation of such a theoretical boundary has so far relied upon the simplifying assumption that all shopping trips start and finish at the home base. For most trips this is probably true, but it must be recognised that the boundary could be drastically extended if shopping was combined with other activities which occur outside of the home. If an agent combines shopping with other activities then the selection of shopping centres will be directly influenced, even determined, by the physical locations of these other activities. If food shopping is conducted in this way then it is outside the scope of the model. However, the model would be capable of assessing the importance of combined activities providing it was possible to relate the proportion of an agent's budget spent on combined shopping trips with certain household characteristics.

It is probably the case that the most important situations would be when the agent combines shopping with work and child related activities. These are also important conditions for determining time constraints, therefore they are an integral part of the model.

At this stage the model depicted in figure 5.2. achieves for a household shopping agent a maximum distance boundary for each possible time element.
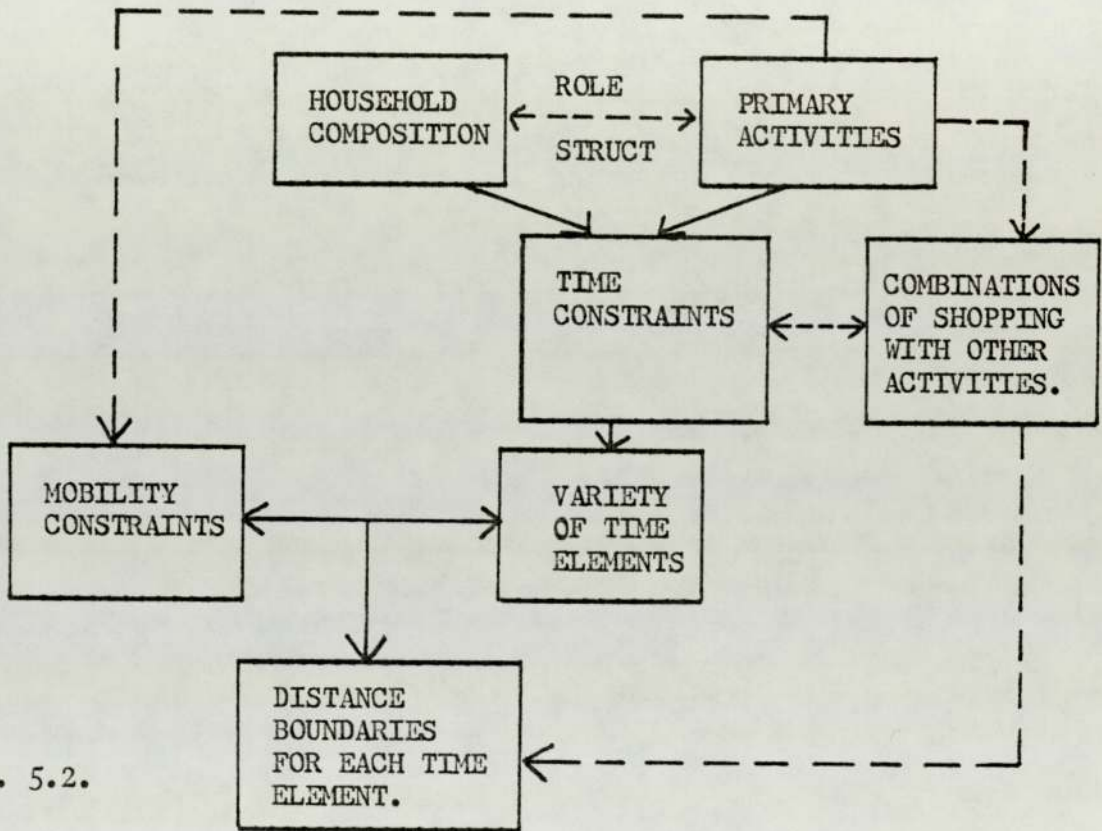
FIG. 5.2.

C) Storage and Attitude Constraints.

For any particular shopping agent the distance boundaries
determined by the mobility and time constraints will hopefully
encompass a selection of shopping locations. It would be a most
unlikely situation for an agent to be so constrained that she was
unable to reach a single shopping centre. But if such a condition
prevailed then the agent would have to accept some form of delivery
service. The next situation would be one in which an agent was
capable of visiting just one particular shopping centre. In such
a case the mobility and time constraints would by themselves have
determined the particular shopping centre that was visited. However,
the most likely situation is one in which an agent was faced with
a choice between at least two obtainable shopping locations. Within
the model, the factors that will help an agent to make the final
selection may be discussed under the general headings of attitude and
storage constraints.

Shopping agents will, by their own experience and by peer group
influences, develop attitudes towards certain stores especially
towards major retailers. At the level of analysis under investigation,
namely the large urban area, most shopping centres will be dominated
by one or two major retailers. If an agent has a favourable attitude
towards a particular store then she is likely to seek out the locations
where those stores are sited. In practice, the preferred store will
be visited if the combined effects of the size of time element and the
mobility level during that element provide a sufficient distance
boundary. Note also that unfavourable attitudes toward stores will
dissuade agents from visiting certain locations.

In this case attitude conditions will constrain behaviour by further reducing the range of obtainable shopping opportunities. It is suggested that a more general attitude construct acting as a constraint to behaviour would be a simple measure of like or dislike of food shopping. Those agents who dislike shopping would possibly be inclined to shop relatively less frequently. This would constrain their behaviour by reducing the number of time elements which they would be prepared to devote to shopping. Also, less frequent shoppers may be persuaded to shop at those locations that would allow most household purchases to be made on one visit. But agents who like shopping would tend to shop more often and seek out a greater variety of shopping opportunities, such agents would be relatively unconstrained.

Household food storage facilities will act as constraints on behaviour in a similar way to attitude constraints. An important storage facility that is likely to cause different food shopping behaviour patterns is the possession of a food freezer. Those agents who have inadequate food freezer storage facilities would be forced to shop more frequently than agents with good food freezer storage facilities. More frequent shopping could mean the selection of a close shopping location. In addition, the possession of a food freezer may encourage agents to visit those stores which cater for freezer owners, this would in itself determine the location that was chosen.

For each shopping agent attitude and storage constraints would together establish shopping frequency patterns, store preferences, and shopping method preferences (supermarket or personal service). These conditions would have to be balanced against the possible distance boundaries during each time element in order to arrive at a final shopping centre location decision.

The model so far is presented in Fig. 5.3.

FIG. 5.3.
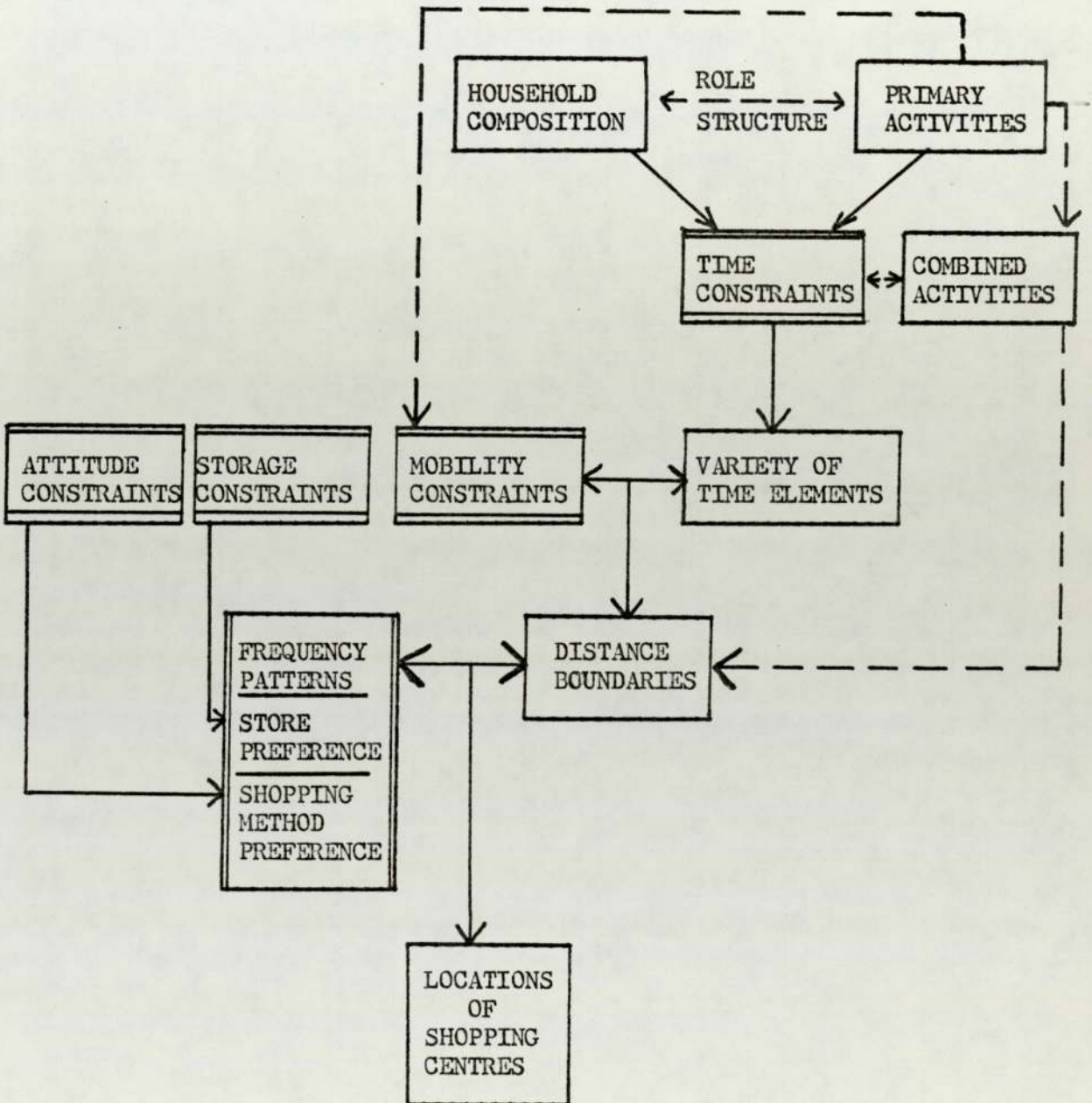
d) The Complete Model.

The representation of the model in figure 5.3. is a simple form
which may be divided into two stages. The first stage determines
distance boundaries around the consumer's home base for every available
time element. The maximum distance boundary separates possible shopping
opportunities from unobtainable ones. At this first stage only time
and mobility constraints have been taken into consideration and in
certain cases, when the maximum boundary encompasses only one shopping
centre, this is sufficient to determine the selected shopping location.
However, in most cases, when the maximum boundary encompasses two or more
shopping apportunities, it is necessary to take account of attitude and
storage constraints in order to determine which centres are chosen. The
selection process that this involves may be designated as the second stage.

In the simple form the four constraints have been presented as
unrelated variables. In reality it is more likely that the constraints
are closely related. For example, an agents attitudes towards shopping
may well stem from her storage, mobility, and/or time conditions.
Favourable attitudes may well be the result of good storage facilities
or good transport availability. However, at this juncture it is not
important to establish precisely how these variables are related but only
to appreciate that an interrelationship does exist.

Finally, it is necessary to include in the model the demographic
segmentation variables that were discussed in Chapter 4. The purpose
of this is to remind the reader that the single concept of constrained
behaviour, as represented by the four constraint characteristics, is an
interpretation of the combined effects of those demographic variables.
It is now possible to present the final theoretical model, fig. 5.4.
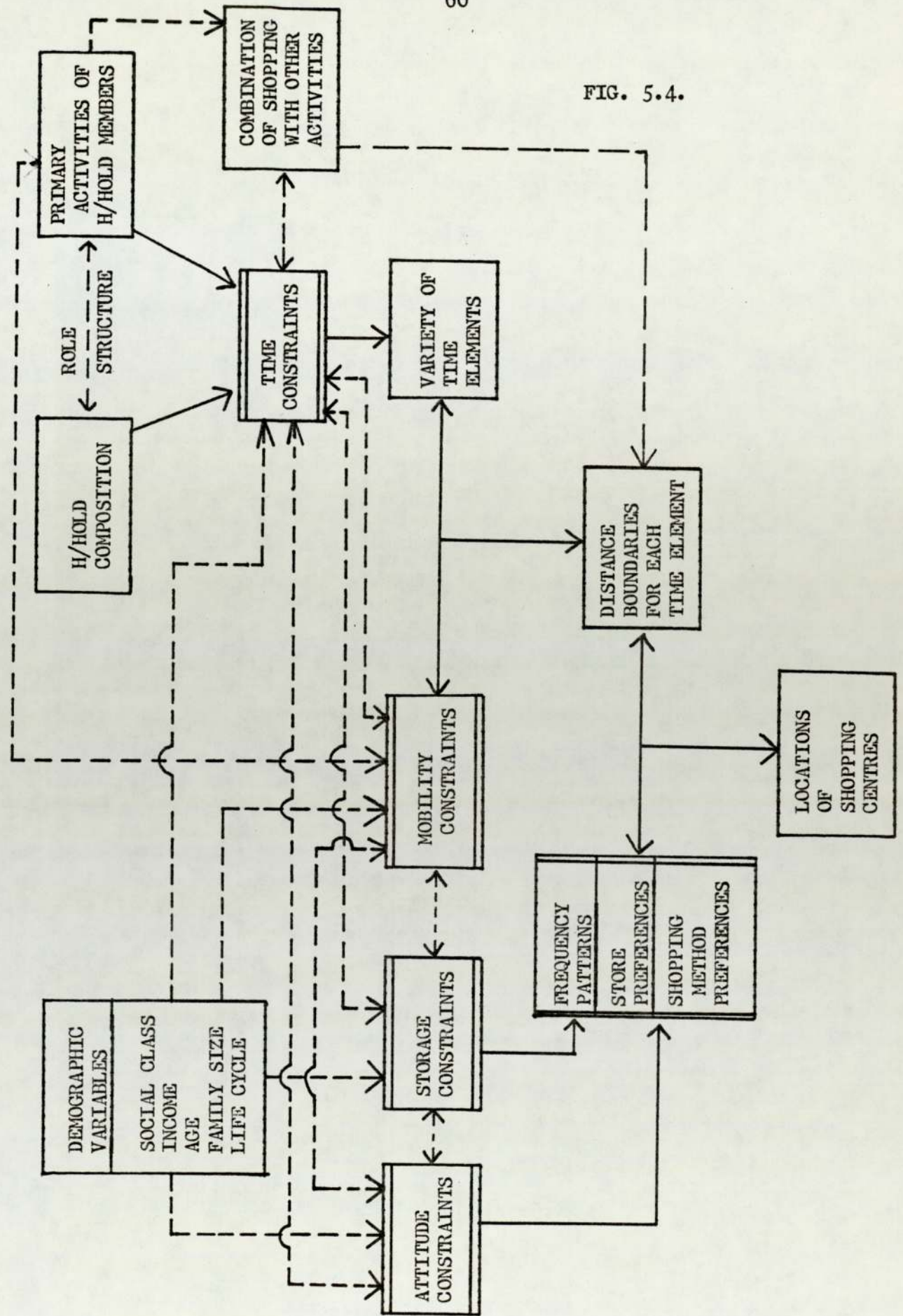
FIG. 5.4.

B.   A Practical Approach using a Constraints Scale.

The theoretical model attempts to understand why people shop for food items at certain locations. Rather than focusing attention on an existing shopping centre and attempting to assess its attraction potential this model concentrates on the home base of an individual shopping agent and attempts to determine which of the obtainable shopping centres she will visit. However, for a retailer or planner to apply this model in practice would be a task of gargantuan proportions. What is needed is an adaptation of the theoretical model which is capable of predicting the behaviour of large aggregates of agents with only minimal calculations.

The basic postulate of the model is that shoppers are constrained in their shopping behaviour. Constrained by the commitments they have to the other activities in which they are involved, constrained by their ability to travel, constrained by their food storage facilities, and constrained by their attitudes. It is hypothesized that together these constraints determine the shopping locations that agents patronize.

If one or more significant qualitative characteristics represented each of the four constraints then groups of agents could be formed from all the possible combinations between the attributes of each of those characteristics. It would then be the case, according to the theory, that agents in the same group would display similar shopping behaviour patterns. Now if these groups of agents were ranked according to the extent that they were constrained in their behaviour then a scale would result ranging from highly constrained groups of agents down to very unconstrained groups of agents, such a scale could be referred to as a 'Constraints scale' and constructed as follows:

Step 1.

First establish the significant characteristics for each of the constraints: For time constraints two characteristics were chosen; The work status of the adults of the household and the status of children in the household. The work status characteristic was broken down into three attributes: (i) where the agent and spouse (if there is a spouse in the household) are both employed outside the home, (ii) where the agent does not work but has a spouse who does work, and (iii) where neither the agent nor the spouse are employed outside the home. The child status characteristic was broken down into three attributes: (i) where the household contains at least one child under full time school age, (ii) where the household contains no children under full time school age but at least one child attending school, and (iii) where the household contains no children. For both of these characteristics the first attribute constrains an agent's available shopping time to a greater extent than the second and, in turn, greater than the third. For mobility constraints one characteristic was chosen; mobility level. This was broken down into four attributes: (i) where an agent has access only to bad public transport, (ii) access only to good public transport, (iii) restricted access to a motor car, and (iv), unrestricted access to a motor car (terms to be defined later). These attributes are ranked according to the degree of constraints imposed on an agent, the first being the most constrained condition. For attitude constraints one characteristic was chosen; a measure of the agent's like or dislike of food shopping. This was broken down into two attributes: (i) where an agent likes shopping and, (ii) where an agent dislikes shoppin g. The first being a more constrained condition than the second.

For storage constraints one characteristic was chosen; the freezer status of a household. This was broken down into two attributes: (i) where a household does not possess a freezer and (ii) where a household does possess a freezer. The first being a more constrained condition than the second .

Step 2.

Establish the relative importance of the characteristics in terms of determining retail selection behaviour. In this way a constraints scale was constructed according to the following set of simplifying assumptions about the relative importance of the characteristics: (i) the variation between the attributes of the mobility characteristic is significantly more important than variation between any other attribute of any other characteristic, (ii) the variation between the attributes of the work status characteristic is significantly more important than variation between the attributes of the child status, attitude, and storage characteristics, (iii) variation between the attributes of the child status characteristic is significantly more important than variation between the attributes of the attitude and storage characteristics, and (iv) the variation between the attributes of the attitude characteristic is significantly more important than variation between the attributes of the storage characteristic.

The scale so constructed has one hundred and forty four discrete groups, the first being the most constrained condition (where the agent has access only to bad public transport, where the agent and her spouse both work outside the home, where the agent looks after children under full time school age, where the agent positively dislikes shopping, and where the household is without a freezer). The one hundred and forty fourth group in the scale represents the least constrained condition.

The Constraints Scale.

Most Constrained.

1	Bad Pub.Trnspt.	Both Adults Work.	Child UFTSA	Hate Shpng.	Without Freezer.
2.	"	"	"	"	With
3	"	"	"	Like	Without
4	"	"	"	"	With
5	"	"	Child at school.	Hate	Without
6	"	"	"	"	With
7	"	"	"	Like	Without
8	"	"	"	"	With
9	"	"	No children	Hate	Without
10	"	"	"	"	With
11	"	"	"	Like	Without.
12	"	"	"	"	With
13-24	"	One work, One not.			
25-36	"	No adults work.			
37-72	Good Pub. Transport.				
73-108	Rest Car				
109-144	Unrest.Car				

Most Unconstrained.

It is now possible to construct hypotheses about the relationships between an agent's shopping behaviour and her position on the scale.

1.   Agents from more unconstained groups are likely to travel greater distances on home based trips to purchase food items than agents from more constrained groups.

2.   There will be a relationship between the extent of constraints imposed on shopping agents and the relative importance (in terms of proportion of money spent) of various types of retail outlets. In this way the more constrained agents will place a greater importance on shopping at local stores, whereas the more unconstrained agents would favour suburban centres.

3.   Highly constrained agents would be more likely to combine shopping with other activities (the other activities are the primary reasons for an agent being out of the home).

4.   As the constraints imposed on an agent are increased then the number of food shopping trips that an agent undertakes is likely to be increased, purchasing fewer items on each occasion.

5.   It is likely that for highly constrained agents the stores they use are not the stores they want to use, but unconstrained agents are more able to shop at the stores they prefer.

6.   Shopping agents from the same constraint group will shop for food items at similar times during the week. The more constrained an agent the more likely that the main food shopping trip is conducted on Saturdays and/or during evening periods, but the less constrained agents will tend to favour weekday shopping.

7.   The more constrained an agent the more the constraints will directly influence the selection of retail outlets. Therefore, highly constrained agents will rate constraint characteristics as more important determinants of store selection than any attraction criterion of retail outlets, the reverse will hold true for the more unconstrained agents.

It is necessary to subject the theoretical concepts developed in the model to a test of validity. The constraints scale derived directly from the theory provides the basis for an empirical investigation. Such an investigation would have as its objectives the provision of data to evaluate the hypotheses and the provision of data to test the simplifying assumptions of relative importance of the constraint characteristics.

CHAPTER 6

THE SURVEY

The primary purpose of the survey was to collect data which could be used to investigate relationships between the constraints scale and patterns of shopping behaviour, thereby testing the hypotheses established at the end of chapter five. In order to establish an agent's position on the constraints scale information would be collected on the characteristics used to represent the four constraints (i.e. the independent variables). These were the work status of the adult members of the household, the school status of the children in the household, the mobility status of the shopping agent, the freezer status of the household and the attitude of the shopping agent toward shopping for food. According to the hypotheses presented in chapter five, agents from different groups would be distinguished according to the following dependent variables: the extent to which they used certain types of shopping centres (measured by the frequency of visits and by the proportion of money spent at a particular centre), the extent to which they combined shopping with other activities (the primary activities that would influence shopping are assumed to be work and child related), the difference in average distances travelled to shopping centres from their home bases, the level of satisfaction with the stores which they regularly used, and the period in the week that they conducted their main shopping trip. In addition, data would be collected on the age and social class of shopping agents so that the influence of these independent variables on the constraint variables could be assessed.

To collect this kind of data it was essential to use one of the main questionnaire techniques; mail questionnaires or personal interviews. The former technique was immediately dismissed because of the necessarily large number and complicated nature of the questions which were to be asked. Also, the response from a mail questionnaire survey may be expected to be very poor and possibly misleading.

For these reasons the procedure adopted for collecting the primary data was to personally interview shopping agents at their homes. Interviewing was confined to a carefully chosen suburb of Birmingham. Carefully chosen because it was hypothesized that shopping agents on various levels of the constraint scale would patronize different shopping centres to a greater or lesser extent, therefore an interview area had to be selected that would allow its residents to exercise a degree of choice. An area bounded by the Kings Heath, Springfield, Hall Green and Billesley districts of Birmingham was selected because it was serviced by a wide variety of shopping opportunities readily accessible to its residents (Appendix 1). The area contained several small collections of local independent stores, it was surrounded by many large suburban centres and was within reach of the city centre. Also, the interview area was serviced by several buses to the city centre and by one bus on the outer-circular route. Finally, the area contained a variety of housing types which, it was hoped, would yield a range of social classes.

To relate the constraints scale to patterns of shopping behaviour it was essential to obtain a sample that was represented by members of each of the groups in the scale. This inferred that the survey be administered on a quota control basis. Theoretically the minimum quota for each constraint group would be at least thirty respondents (the sampling distribution of $\bar{x}$ conforms to the normal distribution when $n > 30$, but a major divergence occurs when $n < 30$). However, with one hundred and forty four groups in the constraints scale it would involve interviewing four thousand three hundred and twenty shopping agents. This was quite beyond the physical capabilities of a single interviewer. A solution to this problem was obtained by basing quotas not on all the five constraint characteristics (incl. variables) but on just the two most important ones. The scale was constructed according to a set of simplifying assumptions about the relative importance of the constraint characteristics.

Variation between the attributes of the Work Status variable was considered to be significantly more important than variation between any other attribute of any other variable except Mobility level. A modified version of the constraints scale comprising Mobility and Work Status yielded only the following twelve groups:

SIMPLE CONSTRAINTS SCALE

Most Constrained.

1	Access to Bad Public Transport,	All adults work.
2	"	One adult works one does not.
3	"	No adults work.
4	Access to Good Public Transport,	All adults work.
5	"	One adult works one does not.
6	"	No adults work.
7	Access to Restricted Car use,	All adults work.
8	"	One adult works one does not.
9	"	No adults work.
10	Access to Unrestricted car use,	All adults work.
11	"	One adult works one does not.
12	"	No adults work.

Most Unconstrained.

Although losing some detail this modified scale would maintain similar predictive capabilities to the complete scale provided the simplifying assumptions of relative importance of variables were valid.

Nevertheless, an important practical consideration was that if thirty respondents represented each of these groups then the minimum sample would require only three hundred and sixty completed questionnaires, a realistic target with the limited resources available.

It is important to stress that although the modified two variable version of the scale would provide the basis for the quota controls, data would be collected on the other constraint variables so that the simplifying assumptions of relative importance could be challenged.

The design of the questionnaire involved two major preliminary stages. The first of these was concerned with the construction of attitude scales. One scale was required to measure an agent's like or dislike of food shopping so that the attitude constraint could be assessed. Another scale was required to measure an agent's level of satisfaction with the stores she regularly used so that the relationship between the level of satisfaction and the level on the constraints scale could be investigated.

The Likert scaling technique was adopted for both of these attitude measures. First a list of statements was drawn up for each of the attitude measures. These statements reflected certain aspects of the subject matter under investigation and were capable of distinguishing between those agents with favourable attitudes. Forty four statements were prepared for the measure of like/dislike of food shopping and thirty six for the measure of satisfaction with existing stores (Appendix 2). It was noticed at this stage that the distinction between the scales was very subtle and some statements could equally refer to either attitude measure. In consequence, certain statements in the 'Like/Dislike' pool were repeated in the 'Satisfaction' pool.

However, it was felt that the internal consistency check would resolve this irregularity. The next stage was to test these statements on a sample of respondents. Seventy five shopping agents (housewives) assisted in this operation by responding to each of the statements in both sets on a five point scale from strongly agree to strongly disagree. The shopping agents for this exercise were approached at their homes with no particular pre-arranged plan. The area from which they were selected was not the same as that selected for the complete survey.

With all the responses collected it was decided which statements measured the positive direction of the attitude and which measured the negative direction. Positive statements in both scales scored five points for a 'strongly agree' response down to one point for a 'strongly disagree' response. Negative statements were scored in the opposite manner. In this way a high total score for the first scale would indicate a relative liking for food shopping and for the second scale a relative satisfaction with the existing stores.

The final stage in preparing the scales was to conduct internal consistency checks. These checks would provide a basis for deciding which statements to include in the final scales and involved calculating for each statement of each scale a correlation between the ith statement score and the total score minus the ith statement score. A high correlation would indicate that the scores obtained for a statement were closely associated with the attitude dimension which was being measured, thereby suggesting inclusion in the final scale. The results of this exercise revealed that none of the correlation coefficients from either scale were staggeringly high (Appendix 3). This suggested a lack of internal consistency probably caused by statements not reflecting aspects of the particular attitude under investigation.

Nevertheless, the scales would be used because it was felt that they would still be capable of distinguishing between relatively large differences in attitudes even though marginal differences would be undetected. The criterion used for eliminating statements from the Like/Dislike scale was a correlation coefficient value of less than 0.4, leaving the following fifteen statements:

3   I can understand that some people find food shopping very enjoyable.

5   Food shopping provides an opportunity for meeting people.

6   Food shopping offers a welcomed change of scenery.

12 I like food shopping because it gives me something to do.

15 Food shopping is boring because the choice of products never varies.

21 Food shopping is a waste of time.

23 I get a great deal of satisfaction from visiting the food shops.

25 We are living in an age when food shopping is pleasurable.

26 I enjoy visiting the food shops because of the friendly atmosphere I find in them.

27 To me food shops are boring places to be in.

30 Food shopping stimulates the mind.

31 It is frustrating being in food shops.

35 Food shopping is exciting because there is always something different to choose.

39 Food shopping can be very appetizing.

44 I believe food shopping to be a necessary evil.

The criterion used for eliminating statements from the 'satisfaction' scale was a correlation coefficient value of less than 0.37, which left the following twelve statements:

4   Sales assistants in food stores are well mannered and pleasant.

7   I enjoy visiting the food shops because of the friendly atmosphere
    I find in them.

8   To me food shops are boring places to be in.

14 My regular food stores charge too much.

16 The assistants in my regular food stores never offer any useful
    advice.

18 At my regular food stores I can always purchase the goods I require.

20 The sales assistants in my regular food stores are more like
    personal friends.

21 There is always a wide choice of products at my regular food
    stores.

23 There is always a friendly welcome at my regular food stores.

24 I find that the prices charged in my regular food stores match
    my pocket.

34 I look forward to visiting my regular food stores.

35 It is always good to see familiar faces in the food shops.

The second major preliminary stage in designing the final
questionnaire was to undertake a series of initial pilot surveys.
Several questionnaires were drawn up, tested, and refined before an
acceptable version was obtained. A final pilot survey was conducted
within the actual survey area by interviewing between thirty and forty
respondents. The respondents were selected so as to include a representation
from all general locations within the survey area and from all groups in the
constraints scale. When the opportunity arose, informal discussions were
also conducted with respondents about the questionnaires they had just
completed.

The whole exercise revealed some unforseen deficiencies in the questionnaire design. This resulted in further revisions to the order and wording of certain questions. Evaluation of the attitude scales indicated that some statements were not producing answers that reflected the respondent's attitude being measured and others simply caused confusion. It was decided that any such statements would be omitted from the sales even though the internal consistency checks had previously encouraged their inclusion. In the case of the Like/Dislike scale, statements 3, 5 and 15 (see Appendix 2) were rejected and in the case of the Satisfaction scale, statements 8, 21, and 23 were rejected.

At the pilot stage it was also decided to supplement the 'Satisfaction' scale with another question which attempted to measure the same thing but in a different way. This was to be achieved by asking the respondent if she was very satisfied, satisfied, partly satisfied, partly dissatisfied, dissatisfied, or very dissatisfied with the food stores, she regularly used.

During the pilot survey a list of all shopping centres in and around the survey area was compiled. This information was then used to prompt answers from respondents who had difficulty in remembering where they had been shopping.

Piloting also provided an opportunity for testing and adjusting the coding scheme and for establishing the more successful times to call on prospective respondents. An important reward obtained from the piloting was that a previously inexperienced interviewer was rapidly gaining interviewing experience which was later to prove to be a valuable asset. An important aspect of this experience was that an improved method of introduction at the door resulted in fewer refusals.

Contrary to the suggestion in chapter 4 (B) that social class should be used together with income, it was decided that only the former variable would be used by referring to the head of the household's occupation. Income is a very personal detail and proved to be a difficult piece of information to extract from respondents.

Finally, during the piloting some confusion arose over certain undefined terms which will now be clarified:

Shopping Agent - The household shopping agent is that member of the household who plans and carries out the majority of food purchases on behalf of the household members.

Household - A household will have one food store that is shared by one or more persons living under the same roof.

Good and Bad Public Transport - Initially respondents were classified according to their own perception of what constituted a good or a bad service. Information was collected on the length of time that an agent took to walk to the bus stop from her home and on the average length of time she had to wait for a bus to arrive. These timings were collected in order to establish a quantitative criterion which would distinguish between good and bad services. Shopping agents were considered to have access only to public transport when they never used a motor car for food shopping.

Restricted Car Use - A shopping agent was classified as having restricted car use for food shopping purposes when either of the following conditions prevailed: a) when an agent used a car for food shopping but its use was restricted to times when a driver was available, in this case the agent was not able to drive. b) When an agent used a car for food shopping but its use was restricted to times when the car was made available, in this case the shopping agent was able to drive but another household member had a claim on the use of the car for certain periods during the week.

Full Time or Part Time Working - Although the information collected was capable of distinguishing between full and part time work for purposes of classification on the constraints scale no such distinction was made.   If an agent or her spouse was employed outside the home for any period of time then such a person was considered to be a worker. Main Food Shopping Trip - The main food shopping trip was the trip on which the greatest number of food items were purchased.

Following the above preparation the final format of the questionnaire was as shown in Appendix 4.   The questionnaire was directed at the household shopping agent and no substitute respondent was permitted. The qualifications of interviewee were established at the introduction stage on the household door step.

The first eight questions on the questionnaire were designed to establish the agent's mobility status.   Each piece of information was coded separately on the questionnaire and at the same time a quota control code was determined such that 0 represented an agent having access only to bad public transport, 1 represented access to good public transport, 2 represented restricted use of a motor car and 3 represented unrestricted use of a motor car.   The next question (no.9) established the characteristics of all the other members of the household including an assessment of the importance of combining shopping with child related activities.   Question ten established the work status of the agent and assessed the importance of combining work with shopping. Together, questions nine and ten allowed the interviewer to complete the quota control by coding the work status of the adult members of the household.

The quota control codes were as follows:-

0.0	Bad Public Transport and	All adults working.
0.1	"	"	One adult working and one not working.
0.2	"	"	No adults working.
1.0	Good Public Transport	"	All adults working.
1.1	"	"	One adult working and one not working.
1.2	"	"	No adults working.
2.0-	Restricted Car use	"	All adults working.
2.1	"	"	One adult working and one not working
2.2	"	"	No adults working.
3.0-	Unrestricted Car use	"	All adults working.
3.1	"	"	One adult working and one not working.
3.2	"	"	No adults working.

It was envisaged that the interview could be terminated at this stage if quotas had been filled.

Question eleven determined the involvement of other household members in food shopping and question twelve unravelled the pattern of locations that the agent visited for food purchases on home based trips (this was post coded). Questions thirteen to sixteen are self explanatory while question seventeen contains the two attitude scales. The remaining questions contained other classificatory data one of which requires explanation. Social class was classified according to 'Her Majesty's Office of Population Censuses and Surveys Classification of Occupations 1971' which distinguishes five social classes; Professional, Intermediate, Skilled (manual and non manual), Partly Skilled and Unskilled.

A point to note about the coding scheme was that in all questions a zero code would represent a 'not applicable question' for that particular respondent.

The interview took between five and ten minutes to administer once contact with a respondent had been established. Selection of interviewees was made by requesting interviews at all households within the survey area until all quotas were filled. A major problem was making contact with prospective interviewees. On most occasions during the daytime the agent was not at home, but evening interviewing was more successful in this respect. Once contact had been established refusal rates were low. In practice these factors meant that approximately one interview was conducted for every ten to fifteen calls. The policy adopted for making contact was to call at a particular house during the daytime and if no contact was made then a second attempt was made during the daytime. If this second attempt also failed to secure contact then an evening or weekend period was tried. In this way limited evening and weekend interviewing time was more successfully utilized. Most working shopping agents were contacted during evenings and weekends.

Interviewing was conducted for five weeks during the period mid June to mid July 1977. This period being carefully selected to begin one week after the schools' half-term holiday and to end before the schools' summer break, for it was considered that an agent's typical shopping patterns would be affected by any abnormal presence of children in the household.

The final number of questionnaires completed was three hundred and fifty two. Not all quotas were filled but this will be discussed in the next chapter.

CHAPTER 7

SURVEY RESULTS AND ANALYSIS

A.   Background Information.

The interview quota of at least thirty respondents for every
constraint group was unfortunately not achieved in the time allocated
for the survey. The following table gives a breakdown of the three hundred
and fifty two completed questionnaires by constraint group:

CODE	GROUP		NUMBER
0.0	Bad Public T,	All work	16
0.1	"	One	6
0.2	"	No	20
1.0	Good Public T.	All	28
1.1	"	One	34
1.2.	"	No	41
2.0	Restricted Car	All	53
2.1	"	One	45
2.2	"	No	13
3.0	Unrestricted Car	All	44
3.1	"	One	41
3.2	"	No	11
			352

Two categories that proved difficult to fill were those household
situations where neither the shopping agent nor the spouse (if there was
a spouse in the household) worked and the agent had in one case restricted
car use (2.2) and in the other case unrestricted car use (3.2). This
situation was probably a reflection of the structural characteristics of
the households in the survey area.

A further characteristic of the survey area caused inadequate responses in all of the 'bad public transport' categories. This characteristic was the admirable quality of the available bus service. Most respondents perceived the service as either satisfactory or very satisfactory; few were dissatisfied. An attempt to interpret perceived quality of service in quantifiable terms did not prove successful because respondents in the survey area were faced with an indistinguishable quality of service. Only marginal differences in average time to walk to the bus stop and average time to wait for a bus existed between those agents who perceived the bus service as good (satisfactory or very satisfactory) and those who perceived it as bad (unsatisfactory or very unsatisfactory). In deriving the constraints scale it was considered essential that differences between good and bad public transport were real and capable of measurement in quantifiable terms. The perceived quality of service was not originally intended to distinguish between the attributes of the mobility variable. In the eyes of the researcher there appeared to be no quantifiable criteria which would effectively distinguish between a good and a bad service for agents living within the survey area. Therefore, it was decided to combine the public transport categories and collapse the constraint scale down to nine groups. The variations in behaviour caused by an agent's perception of bus service quality could be investigated later. Incidentally the nine group constraint scale provided a better distribution of respondents between the groups:

CODE	GROUP		NUMBER OF RESPONSES.
0.0/1.0	No car, All work		44
0.1/1.1	" One work		40
0.2/1.2	" No work		61
2.0	Restricted Car, All work		53
2.1	" One work		45
2.2.	" No work.		13
3.0	Unrestricted Car, All work		44
3.1	" One work		41
3.2	" No work		11
			352

While administering the questionnaire a few deficiencies were revealed which had not been detected at the pilot stage. It soon became obvious that question eleven (see Appendix 4) was incorrectly positioned on the questionnaire. While attempting to unravel the distinction between purchases made on combined trips (questions 9C and 10B) and those on home based trips (question 12) the intervening question about the involvement of other household members introduced confusion for the respondent. Therefore, in the interview situation question eleven was presented between questions twelve and thirteen.

A further deficiency that came to light concerned one of the statements in the Like/Dislike attitude scale. Response to the statement 'Shopping is a waste of time' was almost always one of disagreement. Respondents took the view that shopping was essential for survival; thus it was not a waste of time. This statement was withdrawn from the scale because it was not measuring an aspect of an agent's like or dislike of food shopping.

Finally, much doubt was placed on the effectiveness of question thirteen in assessing an agent's level of satisfaction with the stores she patronized. The question proved very cumbersome to ask and respondents tended to avoid assessing the differences between the categories. Being afraid of further interrogation, if signs of dissatisfaction with regular stores were revealed, the respondents tended to opt for the 'satisfied' category. Therefore emphasis would be placed on the Likert scale to measure the respondents level of satisfaction.

Most questions in the interview were pre-coded according to the instructions given on the questionnaires, but a few were open ended and necessitated post-coding. One open ended question (question twelve) required the respondent to provide details on the number of visits and money spent at all the shopping centre locations which she regularly visited on home based trips. Although the more popular centres were included on the questionnaire it was not possible to anticipate every answer. A comprehensive list of all shopping centres which were visited by respondents was drawn up after the survey was completed. The list included twenty six different locations, comprising the city centre, nineteen suburban centres, and six small groups of local independent stores. It was possible for respondents to regularly visit more than one shopping centre, so for every respondent each location and the extent of its usage was coded separately. The distances that respondents were required to travel from their homes to the shopping centres was also recorded for every centre which was chosen by a particular respondent. The distance used was road distance which was traced on a map and measured to the nearest tenth of a mile.

Question fifteen was another open ended question producing, in this case, twenty one different answers. Each answer was given a unique code and only one code was possible for each respondent.

In question seventeen the scores for every statement in each of the two attitude scales were recorded. The total scores necessary to give a relative measure of each attitude construct were later calculated by the computer.

The final post coding was to assign a zone code to the respondent's home location. The survey area was divided into nine zones, the boundaries being designated by convenient gaps between clusters of houses. These zones also tended to correspond to different types of housing estates. The purpose of this zoning was to subdivide the sample so that behaviour between clusters of houses could be investigated.

It was provisionally decided to carry out most data analysis by utilizing the comprehensive computer statistical package called 'S.P.S.S.' (Statistical Package for the Social Scientist, N.H. Nie 1970/5). The data derived from the questionnaires was transferred directly to coding sheets, being so arranged that computer punch cards could be prepared. Care was taken to reference every coded case to its original questionnaire so that any coding errors discovered at a later stage could be traced back and rectified. In addition to the data cards the special S.P.S.S. control cards were prepared. The complete card deck was then transferred on to magnetic tape for ease of access.

B.   The Sample Composition.

The first stage in the analysis of the data was to construct frequency distributions for each of the qualitative variables and to compute averages and standard deviations for each of the quantitative variables. This exercise provided a partial check on the coding process by revealing non defined codes and/or abnormally large or small means. However, the most important function of this exercise was to investigate the composition of the sample.

Of all households in which an agent was interviewed, 71% possessed at least one motor car. But as far as the agents were concerned only 59% of the total sample used cars for food shopping (comprising 31.5% allowed restricted car use and 27.5% allowed unrestricted car use) which left the remainder, 41%, confined to using the bus service. Incidentally, in approximately half those households possessing a motor car the shopping agent had a full licence to drive. This emphasized the high involvement of other household members to act as drivers in the 'restricted car use' category.

The work status of the household shopping agent and spouse (where applicable) was broken down in the sample according to the following table:

CLASSIFICATION.	CONDITIONS.	SAMPLE REPRESENTATION.
All Adults Working.	Where shopping agent and the spouse, if there was one, also worked.	40%
One Adult Working and one Not Working	A) Where shopping agent worked but the spouse did not work (2.6%) B) Where the shopping agent did not work but the spouse did work (33.4%)	36%
No Adults Working.	Where neither the shopping agent nor the spouse, if there was one, worked.	24%

For the above classifications the distinction between part time and full time working was ignored. But of all the shopping agents in the sample there was a predominance of part time workers, 62% working part time as opposed to 38% working full time. The reverse situation was true for spouses where only 1.3% of working spouses worked part time. This difference was to be expected because the majority (93%) of all shopping agents were female and therefore more likely to be employed on a part time basis.

The mean family size was 3.26 persons with a mode of 2 persons (31.3% of all households in the sample were of size 2), other very common household sizes were 3 and 4.

In 63.1% of all households there were children living at home. Three quarters of these households contained some children who were either under full time school age or attending school on a full time basis.

Of the total sample, 63% did not possess a freezer, but of those who did, 57% used a large upright or chest type and 43% used one of the small freezers which sit on top of the normal refridgerator (20.7 and 16.2% of the total sample respectively).

A fairly even representation of respondents' ages was contained within the sample except for the 'under twenty five' category. But this situation probably reflected the lack of shopping agents of this age category residing in the survey area. The following table shows the relative frequency of each age category in the sample:

under 25	4.3%
between 25 and 35	25.6
" 36 and 45	20.2
" 46 and 60	26.7
over 60	23.3

Finally, the sample displayed a predominance of agents from the 'Skilled' social class (43%), whereas the Professional, Intermediate, Partly Skilled, and Unskilled groups were represented by 14, 24, 16 and 3 percents respectively.

Since the sample was not randomly selected from the survey area it was possible that the above sample composition characteristics were not representative of the characteristics of all members of the survey area. One way of testing the sample's representativeness was to compare its characteristics to known characteristics of the area obtained from the results of other surveys. Some of the statistics that were obtained were not strictly comparable, but the results of the following comparisons table did suggest that the sample was fairly representative of the area. Where it was possible, comparisons were made with statistics derived locally, other than this national statistics were used.

SAMPLE COMPOSITION 1977	LOCAL STATISTICS	NATIONAL STATISTICS	COMMENTS.
CAR OWNERSHIP 71% of all households possessed at least one car.	B'ham City 1971 (1) – 42% Survey Area (1) – 53% West Midlands 1975(2) – 60%		Local statistics show an above average ownership for the survey area in 1971. If the later West Midlands value is increased to take this into account then the sample is comparable.
PERSONS PER HOUSEHOLD Mean – 3.26 Mode – 2	MEAN B'ham City 1971 (1) – 2.97 Survey Area 1971 (1) – 2.9 West Midlands 1975 (4) 2.9	1975 Mode 2 (4) Mean 2.8 (4)	The mean value in the sample appears to be slightly high.
FREEZER OWNERSHIP No Freezer – 63% Small or Large Freezer – 37%		1976 No Freezer – 62% (3) Small or Large – 38%(3)	The sample statistics compare favourably with national statistics.
CHILDREN % of H/holds with children under full time school age or at school – 48%		1974 Households with children 0–15 years – 39% (3)	It is a favourable sign that the sample statistic is higher than the National Statistic because they are not strictly comparable as the former contains children older than 15 years.

Continued.............

SAMPLE COMPOSITION 1977	LOCAL STATISTICS	NATIONAL STATISTICS	COMMENTS.
SOCIAL CLASS Proff. 14%, Int.24%, Sk. 42% Semi Sk. & Unskil. 19%		1973 (3) Proff 18% Int.21%, Sk.35% Semi Sk. & Unskil. 27%	National statistics are not really comparable because social class can vary greatly between different local areas.
HOUSEHOLD SIZE %'ge of H/holds of size (1) 8% (2) 31% (3) 19% (4) 22%, (5+) 19%		1971 (3) (1) 18%, (2) 32%, (3) 19%, (4) 17%, (5+) 14%	A reasonable comparison.
AGE OF S.AGENT (<25) - 4%, (25-35) 25% (36-45) 20%, (46-60) 27% (>60) 23%	West Midlands 1971 (1) Females age structure (<25) 10%, (25-35) 19% (36-45) 20%, 46-60) 33% (>60) 18%		Not strictly comparable figures as not all females are shopping agents.
WORK STATUS OF ADULTS All work (40%) One work (36%) No Work (24%)	1973 (3) 2 or more adults working per household - 45% 1 " - 34% 0 " - 22%		Not strictly comparable but very similar statistics.

(1) City of Birmingham 1972. (2) H.M.S.O. 1975.₁ (3) Market Research Great Britain 1976. (4) H.M.S.O. 1975.₂

C.   <u>Preliminary tests of the Simple Constraints Scale.</u>

The nine group constraint scale was constructed by using the two independent variables of mobility status of the shopping agent and work status of the adult members of the household. It was assumed that behavioural variation between the attributes of these variables would be more significant than variation between the attributes of any other independent variable. By adhering to this assumption some preliminary tests of the hypotheses postulated at the model building stage (Chapter 5) were undertaken.

The first test was to see how well the constraints scale distinguished between the extent to which shopping agents used different types of shopping centres. Shopping centres were classified into three types, the city centre, suburban centres, and local independent stores. The extent of usage was assessed by the proportion of the total weekly food expenditure spent at each of these centres and the number of weekly visits to each of these centres. When comparing changes in the average values of these variables for each constraint group there did not appear to be any straight relationships (Appendix 5 table 1). But if the constraints scale was broken down into its two compenent variables and the dependent variables compared with each one separately, then certain patterns were suggested (Appendix 5 Table 2). As an agent's mobility constraints were increased there was a tendency, on home based trips, to show an increased usage of the city centre and local stores. But as an agent's work status constraints were increased there was a tendency to show a reduced usage of the city centre and local stores on home based trips. (Usage of the suburban centres was difficult to interpret as only the proportion of money spent and mobility showed any relationship)

The mobility relationships could be explained in terms of the constrained behaviour theory. The more constrained agents, those having no car, would find it relatively easy to use the city, because of the good available bus service, and the local stores, because of their proximity. Car users have the means to bypass the higher prices and restricted variety of the local stores and concentrate more on the larger supermarkets located in the suburban centres. Car users would also be deterred from city centre shopping by the difficulty of parking their cars. Unfortunately, the work status relationships with the extent of usage of different centres appeared in part to contradict the constrained behaviour theory and as such were difficult to interpret. The theory suggests that agents who do not work have more time available for shopping and would therefore visit more distant shopping centres. This was upheld for city centre shopping but the results for local store usage conflicted with the theory. In total terms the theory also suggests that more constrained agents would undertake fewer home based trips. The results for work status were in agreement but less mobile agents were shopping more frequently. This latter relationship may relate to an agent's physical carrying ability (also a constraint) in that agents without cars need to shop more frequently than agents with cars so that they may transfer the same quantity of goods in a given period. Therefore this would suggest that more constrained agents were shopping more frequently but purchasing fewer items on each occasion.

A second test of the simple constraints scale was to relate it to the extent that shopping was combined with other activities. It was hypothesized that more constrained agents would be more inclined to combine shopping with other activities. For the purposes of investigation the only other activities included were working and taking children to school.

As expected, the work status variable was highly related, but note that those agents who did not work had no opportunity to combine work with shopping (Appendix 5. Table 3). However, an unexpected result appeared when relating mobility to the proportion of money spent on combined trips. As mobility constraints increased the average proportion of money spent on combined trips declined, suggesting a reversal of the hypothesis. This result may be explained by referring again to an agent's physical carrying ability. Those agents with cars, although less constrained, would be more able to combine shopping with other activities.

An attempt to relate the constraints scale to the average distance per trip on home based trips, to test whether less constrained agents would travel further, was unsuccessful (Appendix 5 Table 4). But if the city centre had either been located closer to the survey area or had been serviced by less efficient buses, then a relationship with mobility may have been detected because the 'no car' agents were favouring city centre shopping which was the furthest shopping centre from the survey area.

The next test of the constraints scale was to relate it to scores obtained from the Likert 'Satisfaction' scale. It was hypothesized that more constrained agents would be less able to visit the stores they preferred. Therefore they would show a relatively lower level of satisfaction with the stores they regularly used. The simple scale failed to show a direct relationship but the work status variable, when taken in isolation, did support the hypothesis (Appendix 5 Table 5).

Finally, by analysing the periods when agents undertook their main shopping trip it became apparent that relationships existed with the various constraint groups.

Again the complete scale failed to show a direct relationship
(Appendix 5 Table 6), but relationships with individual variables
were uncovered. In all cases shopping during the daytime in the week
was always the most popular period. As work status constraints were
increased this week day superiority was challenged by evening and
Saturday periods (Appendix 5 Table 7). Also the 'restricted car'
group displayed a significantly different pattern of behaviour to the
other two mobility groups by favouring evening and Saturdays for
their main trip. A possible explanation is their need for a car
and/or a driver, which in most cases would become available during
the evening and Saturday periods.

These preliminary tests of the constraints scale were encouraging
to the extent that the variables used to construct the scale did
individually display substantive relationships with the dependent
variables. But, as no straight relationships were indicated then
doubt was placed on the simplifying assumptions of relative importance
of the constraint variables which were used to form the simple
constraints scale.

The survey collected data on many other potential independent
variables. Therefore, the next stage in the analysis was to see how
these remaining, and so far unused, variables were distributed
throughout the nine levels on the constraints scale.

D.   The distribution of the remaining independent variables
      throughout the nine constraint groups.

If the simplifying assumptions about the relative importance
of the independent variables applied then, theoretically, the predictive
ability of the nine group constraints scale would not be affected when the
remaining independent variables (Child status, Attitude, Freezer
ownership) were unevenly distributed throughout the groups.

But in practice these assumptions may not hold, indeed at this stage of the analysis they have already been challenged. In this situation any behavioural variation between the constraint groups could be caused by the uneven distribution of the remaining independent variables and not by the two primary variables used to construct the scale. At this juncture it was also considered necessary to include 'social class' and 'age' as additional independent variables. The theoretical model incorporated the influence of these two variables in terms of how they constrained behaviour. But it was felt that in practice these variables could contain an additional dimension which would provide a more complete basis for differentiating between patterns of retail selection behaviour. Therefore it was also important to see how social class and age were distributed throughout the nine constraint groups.

The distributions of attitude assessment and child status (used size of household as a proxy for the constraints imposed by children in the household) were checked by computing the average values of these variables for each constraint group. The averages showed considerable variation between the groups. The distributions of freezer ownership, social class, and age were checked by computing the percentage of the attribute of each variable contained in each and every constraint group. Again the distribution of these three variables showed variation between the constraint groups. Therefore the influence of the five remaining independent variables on location selection behaviour was not controlled for in the sample composition. But if the survey contained a representative sample of the characteristics (the attributes of the independent variables) of the survey area then uneven distributions would simply be a reflection of existing relationships between independent variables. The relationships between the constraints scale and the independent variables were as follows.

Higher social classes tended to be found in the 'unrestricted car' categories and the lower social classes were to be found in the 'no car' categories (Appendix 5 Table 8), indicating that the lower the social class the more constrained shopping agents were in terms of transport availability. Also there was a tendency for households containing 'one' adult worker and a shopping agent not working to come from higher social classes, whereas the 'no adults working' households tended to be filled by lower social classes. An even distribution was recorded for the 'all adults working' households (Appendix 5 Table 9).

Elderly respondents (over 60 years) were to be found in greater numbers in the 'no car' categories (Appendix 5 Table 10), but more especially, they dominated the 'no adults working' category (Appendix 5 Table 11), which was to be expected.

Proportionately more of the car owners than non car owners owned large freezers (Appendix 5 Table 12). Households containing workers were also more inclined to possess a large freezer (Appendix 5 Table 13). However, this may have been caused by the fact that the sample of workers were more likely to possess cars than the sample of non workers (Appendix 5 Table 14).

Average household size was fairly similar for each of the mobility categories (Appendix 5 Table 15), but showed variation between the work status categories. The most noticeable difference was the smaller family sizes in the 'no adults working ' category (Appendix 5, Table 16), probably due to the predominance of older respondents in this group.

The average scores obtained on the Like/Dislike attitude scale also varied between the constraint groups. More highly constrained agents, in terms of work status, showed a greater dislike for shopping.

But in contrast, the more highly constrained agents, in terms of mobility status, showed a relative liking for shopping (Appendix 5, Table 17). However, if social class was related to a measure of like or dislike of food shopping then mobility may have been acting as a proxy variable for social class. This was investigated by producing a simple breakdown of average scores obtained on the attitude scale (Appendix 5, Table 18). The results were not particularly convincing but there was a suggestion that higher social classes scored lower, indicating a relative dislike of food shopping which could have accounted for the relationship between mobility and attitude score.

Up to this stage by simply comparing the attributes of two variables at a time several relationships between the constraints scale and the remaining independent variables were suggested. In addition there were several potential relationships that needed to be investigated between the remaining independent variables themselves. From simple percentage tables and breakdowns of average values the following relationships were found.

Higher social classes were more likely to own larger freezers and they also scored relatively lower on the Like/Dislike attitude scale indicating a relative dislike of food shopping(Appendix 5, Table 19). The over sixty age group were normally from smaller families, tended not to own a freezer and indicated a relative liking for food shopping (Appendix 5 Table 20). Finally larger households were more inclined to own a freezer and to express a relative dislike for food shopping (Appendix 5, Table 21).

The following table briefly summarizes the suggested interrelationships between all the independent variables.

RELATIONSHIPS BETWEEN INDEPENDENT VARIABLES.

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	WORK STATUS OF ADULTS	MOBILITY	SIZE OF HOUSEHOLD	FREEZER OWNERSHIP	SOCIAL CLASS	AGE
LIKE/DISLIKE SCALE SCORE	Both adults working score lower (dislike more) than no adults working.	No	Larger households are more inclined to dislike shopping.	Freezer owners are more inclined to dislike shopping.	Lower social classes like shopping more than higher social classes	Over 60 year olds like shopping more than other age groups.
AGE	Over 60 year-olds dominate the No Adults Working Categories.	Over 60 year olds are more inclined not to have a motor car.	Small household in the very young and very old age groups.	Over 60 year olds are more inclined not to own a freezer.	NO	–
SOCIAL CLASS	Higher social classes dominate the one adult not working. Lower social classes the no adults working	No car dominated by lower social class. Unrestr. car use dominated by higher social class.	NO	Higher social classes are more likely to own a larger freezer.	–	–
FREEZER OWNERSHIP.	Workers are more inclined to own freezers.	The greater the mobility the more likely to own a larger freezer.	Larger households more inclined to own a freezer	–	–	–
SIZE OF HOUSEHOLD	No work groups from smaller h/holds.	NO	–	–	–	–
MOBILITY	Workers are more inclined to have a car	–	–	–	–	–

The next stage in the analysis was to look for simple relationships between the remaining independent variables and the dependent variables. In this way the effects of the former variables on the original relationships between the nine group constraints scale and the dependent variables could then be assessed.

E. Relationships between the remaining independent variables and the important dependent variables.

Again percentage tables and averages were used to provide substantive evidence of relationships.

Firstly, the relative importance of the three types of shopping centre was investigated (Appendix 5, Table 22). Agents with better storage facilities tended to favour suburban centres rather than local stores or the city centre stores. Lower social classes did not use suburban centres so much as other classes. In addition the professional class tended to avoid the local stores. Over sixty-year-olds behaved significantly different to other age groups in that they tended to favour the city and local stores for their shopping. This favouritism towards the city centre was at first puzzling, but undoubtedly an important exogenous factor which explained this behaviour was that during certain periods in the day the Birmingham bus service was free to old age pensioners.

Because social class was related to freezer ownership, higher social classes were more inclined to own freezers, then possibly the one to one freezer ownership relationship with the extent of usage of different types of shopping centres could be partly explained by the social class variable.

Also, because the over sixty age group tended not to own freezers the freezer ownership relationship with usage of centres could again be partly explained but in this case by the age variable. It appeared that together age and social class would account for the freezer ownership relationship. Theoretically this could have been checked by breaking down the proportion of money spent at various centres into each of the freezer ownership attributes while controlling for social class and age. With a sample size of three hundred and fifty two then seventy five cells would have been required for such a breakdown, the results of which would have been very unreliable.

Secondly, the importance to the agent of combining shopping with other activities was investigated. Neither freezer ownership, social class nor age appeared to influence whether or not shopping would be combined with other activities. But given the decision to combine shopping then these variables did affect the extent to which this occurred (in terms of proportion of money spent). Of those respondents who combined work with shopping the freezer owners among them placed less importance on this method of shopping than the non owners (Appendix 5, Table 23). The opposite was suggested for those respondents who combined child related activities with shopping (Appendix 5, Table 23). Combining work with shopping was less important for the respondents from the professional class, but in contrast they placed more importance on combining shopping with child related activities (Appendix 5, Table 23). There were no other differences between the social classes. No relationship was apparent with the age variable (Appendix 5, Table 23) except to note the obvious.

Old people would not be combining child related activities with
shopping simply because there would not be children in the home.
But the relationship between social class and freezer ownership could
also mean that the social class variable would partly account for the
relationship between freezer ownership and the importance of combining
shopping with work or child related activities.

Thirdly, the average distance per shopping trip was investigated.
Unfortunately the differences between groups were very small which made
it very difficult to uncover relationships. However, certain
possibilities were suggested. Higher social classes, freezer owners,
and older respondents (because of city usage) all tended to travel
further distances on their shopping trips (Appendix 5, Table 24).

Finally, there were two other important relationships with
dependent variables that should be mentioned. The size of the
household was found to be positively related to the total number of
shopping trips per week (Appendix 5, Table 25), and the score on the
'like/dislike' scale was highly correlated with the score on the
'satisfaction' scale ($r = 0.703$). In a way the latter was to be
expected because of the difficulty in distinguishing the two attitude
concepts at the scale construction stage.

The results of these investigations indicated that some of the
independent variables not used in the construction of the nine group
constraints scale were important determinants of variation in the
dependent variables. Because of their uneven distributions throughout
the nine group scale they were a source of error when assessing the
predictive capabilities of the scale; as such they could be referred
to as possible confounding variables.

F.   <u>The Effectiveness of the Nine Group Constraints Scale.</u>

With the knowledge of the suggested relationships between the independent and dependent variables and also between the independent variables themselves, it was possible to re-investigate the relationships between the simple two variable constraints scale and the dependent variables. But this time by attempting to control for the effects of the confounding variables.

One relationship investigated was between the nine group constraint scale and the extent of usage of certain types of shopping centre, while controlling for the effects of social class. The results of this investigation left the original relationships with the constraints scale basically unchanged but slightly weaker (Appendix 5, Table 26). This analysis used a three level breakdown table which provided forty five cells (9x 5 = 45), and the only group in the social class variable that provided an adquate number of responses in each of the constraint groups was the 'skilled' group. It was by referring to this group alone that the conclusion above was reached. Had it been possible to control for age at the same time then it was anticipated that the superiority of the mobility and work status variables would have been challenged.

Other relationships between the scale and dependent variables were re-investigated while controlling for the possible effects of confounding variables. But in all these other cases the insufficient cell size proved to be a major problem with crosstabulation and breakdown tables of three or more levels. Nevertheless, it was apparent at this stage of the analysis that the simple two variable constraints scale was an insufficient analytical tool. There was no evidence to support the simplifying assumptions of relative importance of independent variables. Indeed, in many relationships with dependent variables the work status variable appeared to be a more important determinant of behaviour than the mobility variable (the reverse was hypothesized).

Also there were suggestions that all the independent variables were directly related to one or more of the dependent variables. In fact, insufficient cell sizes in crosstabulation and breakdown tables of more than two levels resulted in great difficulty in establishing which of the independent variables were the important determinants of behaviour. This problem was further aggravated by the complex interrelationships which existed between the independent variables. This situation required higher levels of breakdown and crosstabulation tables. It was therefore necessary to adopt a new approach capable of assessing the ability of the constraint variables to predict behaviour.

G. Principal Component Analysis.

The previous analysis had shown that the independent variables were highly interrelated. By using principal component analysis it was possible to uncover any underlying patterns in these relationships. Such patterns could be used to rearrange the data contained in the independent variables so as to create a smaller set of new variables, called components or factors, which would replace the original variables. What this meant was that those original variables which were highly related would be merged to form one new variable. It was hoped that transformation of the original variables into a set of new variables (factors) would reveal important relationships which had proved difficult to uncover among the variables in their original form.

In principal component analysis each new variable (factor) is a linear combination of all the original variables. The first factor is the single best summary of linear relationships exhibited in the data, it accounts for more of the total variance of the original variables than any other linear equation could.

The second factor is the second best linear combination of the
original variables, accounting for more of the remaining variance
than any other linear equation and is orthogonal to the first.
Subsequent factors are defined similarly until all the variance in
the data is exhausted.

For the actual principal component analysis the complete set of
independent variables was used (Appendix 6). Variables were
required to be at least ordinal in their level of measurement. If
an ordering of the attributes of each variable was interpreted in terms
of levels of constrained behaviour then the level of measurement
condition was satisfied.

The factor analysis program in the S.P.S.S. package was used to
undertake the principal component analysis. The first step in this
analysis was to calculate product moment correlation coefficients
between all the independent variables. This served as the input for
the next step which was to construct the set of factors (new variables).
In the principal component solution these factors are exact mathematical
transformations of the original data. Initially there are as many
factors as there are original variables (sixteen in this case). But
many of the factors that are constructed are insignificant. The
significance of a factor is judged by the amount of the total variance
in the data which is accounted for by the particular factor; this amount
is given by the eigenvalue of the factor. Because all the original
variables are normalized then the variance of each is equal to unity.
Therefore when the eigenvalue of a factor is less than unity the factor
is considered insignificant because the amount of total variance
accounted for by such a factor is less than an amount accounted for by
any one of the original variables.

The respective eigenvalues for the sixteen factors that were constructed from the data are shown below:

FACTOR.	EIGENVALUE	PERCENT OF VARIANCE	PERCENT CUMULATIVE.
1	4.685	29.3	29.3
2	2.249	14.1	43.3
3	1.712	10.7	54.0
4	1.394	8.7	62.7
5	1.266	7.9	70.7
6	1.051	6.6	77.2
7	0.800	5.0	82.2
8	0.638	4.0	86.2
9	0.577	3.6	89.8
10	0.387	2.4	92.2
11	0.354	2.2	94.5
12	0.263	1.6	96.1
13	0.226	1.4	97.5
14	0.180	1.1	98.6
15	0.145	0.9	99.5
16	0.073	0.5	100.0

Examination of the eigenvalues reveals that only the first six factors are significant, the seventh having a value less than unity. The percentage of the total variance in the data that was accounted for by each factor was obtained by dividing the eigenvalue by the total number of original variables. In this case it can be seen from above that the first six factors accounted for 77.2% of the total variance in the data. Therefore these six factors provide a good alternative explanation of the original sixteen variables.

The final step in the principal component analysis was to rotate the six factors to a terminal solution. This solution simplified the factor structure by finding the position where a factor loaded more heavily on a few variables rather than loading more eavenly on all variables, thus making each factor easier to interpret.

The following table contains simple correlation coefficients between the six factors in the terminal solution and each of the original variables.

INDEPENDENT VARIABLES.	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
Size of H/Hold	−0.840	0.120	0.377	0.161	0.341	−0.032
Spouse in H/Hold	−0.301	0.155	0.582	0.087	0.711	−0.262
Others in H/Hold	−0.292	0.059	0.854	0.051	0.273	−0.222
Children U.F.T.S.A.	−0.887	0.048	0.084	0.135	0.299	−0.084
" at school.	−0.915	0.187	0.145	0.184	0.269	−0.087
" Working.	−0.825	0.198	0.220	−0.031	−0.102	−0.085
Involvt. of other.	−0.089	0.082	0.851	0.145	0.037	−0.042
Freezer own.	−0.151	0.158	0.116	0.098	−0.009	−0.789
Age.	0.449	−0.285	0.015	−0.455	−0.578	0.100
Social Class	−0.170	0.075	0.015	−0.143	−0.469	0.605
Score Like	0.131	−0.296	−0.115	−0.896	−0.182	0.165
" Satis.	0.066	−0.108	−0.075	−0.912	−0.054	0.094
Spouse Job St.	−0.359	0.327	0.265	0.155	0.854	−0.264
S/Agent Job St.	−0.014	0.934	0.017	0.167	0.003	−0.118
W/S of Adults.	−0.253	0.911	0.122	0.281	0.362	−0.222
Mobility of S/A	0.102	−0.211	−0.163	−0.149	−0.279	0.769

By taking one row of the table at a time it was possible to see
which factor had the best correlation with each original variable. In
this way it was discovered that certain variables were grouping
together under certain factors. Where groupings occurred it meant
that the factor would provide an adequate explanation of the variance
in those original variables in the group. Therefore Factor 1 was
able to replace the following variables: the presence of children
under full time school age, the presence of children at school,
the presence of children at work, and the size of the household.
Factor 1 was interpreted as a 'size family structure' variable that
emphasized the presence of children. Factor 2 was able to replace the
following variables: work status of the adults and the shopping agent's
job status. This factor was interpreted as a 'work status' variable.
Factor 3 was capable of replacing the involvement of other members of
the household in shopping and the presence of others in the household
(others being persons other than a spouse or children). This factor
was difficult to interpret and name. Factor 4 was able to replace the
two attitude scales and was itself interpreted as an attitude construct.
Factor 5 replaced the age of the respondent, the presence of an agent's
spouse, and the job status of the spouse, it was interpreted as an
'age family structure' variable. Factor 6 was interpreted as an
'affluence' variable by replacing freezer ownership, social class and
mobility level.

This principal component analysis was encouraging because it had
been possible to interpret most   factors in a meaningful way.
It also helped to sort out the interrelationships which existed
between the original independent variables. Next it was proposed
to investigate the relationships between the factors and the dependent
variables. Before this could be done values for the factors had to
be computed for each case (each respondent).

This was possible using the regression weights from the linear combinations of the original variables which were computed to produce the factors. Scores for each factor were obtained by summing the results of the multiplication between the values of the original variables, in standardized form, and their respective regression weights. Only those variables that were highly correlated with a particular factor were used to compute the scores for the factor. For example, the scores for each respondent on the sixth factor, the affluence variable, were obtained as follows:

Score on the new   =   -0.549 (Value on freezer ownership variable
Affluence variable   in standardized form) + 0.345 (value on
                            social class variable in standardized form) +
                            0.468 (value on mobility status variable in
                            standardized form)

where ,   -0.549, 0.345 and 0.468 were the respective
                            regression weights obtained from the linear
                            combinations.

standardized form of a variable =

$$\left(\frac{\text{Actual value of variable for respondent} - \text{mean of the variable}}{\text{standard deviation of the variable}} \right)$$

To give some meaning to a high or a low score for each new variable it was necessary to relate the coding values of the original variables (Appendix 6) to the directions of the relationships between the original variables and the new variables (obtained from the correlation coefficients). This exercise revealed the following meanings:

Factor 1 - Size Family Structure Variable

    High score = relatively unconstrained = Small household, no children under full time school age, at school, or at work.

    Low score = relatively constrained = Large household, with children under full time school age, and/or at school, and/or at work.

Factor 2 - Work Status Variable

    High score = relatively constrained = S.Agent having a full time job Both adult members working.

    Low score = relatively unconstrained = S. Agent no job, no adults working.

Factor 3 - Involvement Variable

    High score = relatively constrained = Presence of others, more involvement of others.

    Low score = relatively unconstrained = No other members, no involvement of others.

Factor 4 - Attitude Variable

    High score = relatively constrained = relative dislike and dissatisfaction.

    Low score = relatively unconstrained = relative liking and satisfaction.

Factor 5 - Age Family Structure Variable

    High score = relatively constrained = Spouse has full time job, spouse is present, younger shopping agents.

    Low score = relatively unconstrained = Spouse no job, no spouse, older shopping agents.

Factor 6 - Affluence Variable

High score = relatively constrained = No car, lower social class, no freezer.

Low score = relatively unconstrained = Unrestricted car use, higher social class, large frezer.

With scores computed for each respondent on every factor (new variables) it was possible to utilize multiple regression to assess the strengths of association between the new independent variables and the original dependent variables.

H. Multiple Regression.

Multiple regression is a technique that can be used to evaluate the overall dependence of a variable on a set of independent variables. This is achieved by constructing a linear combination of independent variables which correlates as highly as possible with the dependent variable. ($y = b_1 I_1 + b_2 I_2 + b_2 I_3 \ldots b_n I_n + c + r$, where y = dependent variable, $b_1 b_2$ = the regression coefficients, $I_1 I_2 \ldots =$ the independent variables, c = constant, r = the residual).

It was possible by adopting this technique to assess the proportion of variance of a dependent variable that was explained by all the independent variables operating jointly (the square of the multiple correlation coefficient, R^2). This proportion of variance measure reflected a level of success of the independent variables in being able to predict values of the dependent variable.

Again the 'S.P.S.S.' package was used to undertake the multiple regression analysis runs. The set of independent variables that were used in each regression analysis run were those created from the principal component analysis (Appendix 7), whereas the dependent variables were in their original form.

The following table summarizes the strengths of the relationships that were found with the dependent variables which are used to assess the importance of certain types of locations.

Dependent Variable	Multiple R	(Multiple R)^2
Proportion of money spent at the City	0.286	0.082
—do— Suburban Centres	0.291	0.085
—do— Local Stores	0.391	0.153
Number of visits to City centre, per week	0.301	0.091
—do— Suburban Centres "	0.145	0.021
—do— Local Stores "	0.371	0.138

Unfortunately, none of the relationships were particularly strong. In the best case the set of independent variables were able to explain only 15% of the total variance in the proportion of money spent at local stores. Nevertheless, overall significance tests (F – tests) for each multiple correlation coefficient indicated that it would have been most unlikely (at a 0.1% significance level) to obtain these sample results if the population multiple correlation coefficient was itself zero. All coefficients were significant except for the 'number of visits to suburban centres.'

Even though the multiple correlation coefficients were not high it was possible to distinguish the more important independent variables. This was achieved by comparing the simple bivariate correlation coefficients (Appendix 8) with the multiple correlation coefficients to assess whether the inclusion of a particular independent variable into the regression equation had substantially improved the multiple correlation coefficient. This exercise suggested that the first,second, fifth and sixth newly created independent variables were the more important determinants of the dependent variables. The first being the 'size family structure' variable, the second being the 'work status' variable, the fifth being the 'age family structure' variable, and the sixth being the 'affluence' variable (Appendix 8).

The directions of the relationships were indicated by the regression coefficients. For city centre usage, in terms of the proportion of money spent and the number of visits, the size family structure variable was positively related, the work status variable was negatively related, the age family structure variable was negatively related, and the affluence variable was positively related. In detail these relationships suggested that city centre shopping was undertaken more by agents from smaller households, from households without children, from households where neither adults worked and from older age groups. In these terms city centre shopping was more important to unconstrained agents. But in contrast less affluent households (no car, lower social class, no freezer), who could be described as more constrained agents, were also inclined to favour the city. For suburban centre usage the size family structure variable was negatively related, the age family structure variable was positively related, and the affluence variable was negatively related.

These relationships suggested that suburban centres were favoured on the one hand by more constrained agents, constrained by larger households, by the presence of children and a spouse, and on the other hand favoured by more unconstrained agents, unconstrained by not having a job, by having unrestricted car access, by having a large freezer and by being members of higher social classes. For local store usage the pattern was a little more complicated. The proportion of money spent at local stores was positively related to the size family structure variable but the number of visits was negatively related to this variable. This suggested that small households with no children tended to spend proportionately more money at local stores, but that large households with children were more inclined to visit the local stores. The latter may have arisen because shopping agents with children could obtain a change of scenery by visiting the local stores even though they did not spend most of their money in them. In addition, local store usage (both indicator variables) was also negatively related to the work status variable, negatively related to the work status variable, negatively related to the age family structure variable, and positively related to the affluence variable. These relationships indicated that local stores were more inclined to be used by agents from households with no adults working, by older agents (so far more unconstrained), by agents without a car or a freezer and agents from lower social classes (more constrained).

These suggested directions to the relationships between the independent variables and the importance of certain types of centres placed doubt on the hypothesis that the behaviour of an agent could be determined by her level on a scale of constraints.

The behaviour patterns suggested above caused a conflict in the constraint concept between independent variables. In this way, more constrained agents in terms of the affluence variable favoured City and local store shopping, but more constrained agents in terms of the age family structure variable favoured suburban centres. Also more constrained agents in terms of the size family structure variable favoured suburban and local stores and more constrained agents in terms of the work status variable did not favour home based shopping at all but placed emphasis on combined shopping.

Multiple regressions were also computed for the dependent variables concerned with the importance of combining shopping with other activities. At first sight the multiple correlation coefficients were a little more encouraging than the previous set.

Dependent Variable.	Multiple R	(Multiple R)^2
Proportion of money spent on Work combined trips.	0.543	0.295
-do- Child -do-	0.323	0.104
Number of work combined trips.	0.576	0.330
-do- child -do-	0.381	0.145

All multiple correlation coefficients were significantly greater than zero (0.1% sig level), but for all of these regressions there was no significant improvement over simple bivariate regression analysis. For the proportion of money spent on work combined trips 25% of the variance was explained by using only the 'work status' variable in a bivariate regression as opposed to 29% of the variance explained by the complete set in a multiple regression.

For the number of work combined trips the work status variable alone explained 30% as opposed to 33% of the variance. Together these variables suggested that agents who worked full time and had a spouse also working full time would place greater importance on combining shopping with work activities.

For the proportion of money spent on child combined trips the size family structure variable alone explained 8% as opposed to 10% of the variance in the multiple regression. Also for the number of child combined trips the size family structure variable alone explained 12% as opposed to 14% of the variance in the multiple regression. The direction of these relationships was such that larger households with children were more inclined to combine shopping with child related activities than smaller households without children.

Both the above combined activity relationships were obvious because non workers would not be able to combine shopping with work and agents without children would not be able to combine shopping with child related activities. Indeed, what was surprising was that higher correlations were not obtained.

A multiple regression was also calculated with the average distance per trip as the dependent variable but it failed to produce a coefficient which was significantly greater than zero, even at a 5% significance level.

The first result of this multiple correlation analysis was to supply additional evidence of the importance of the independent variables in being able to determine which shopping centres people would patronize. Nevertheless, by looking at each dependent variable separately it had not been possible to obtain any one relationship which could satisfactorily explain the variance in any dependent variable.

The second and most important result of this analysis had been to place doubt on the central concept of a scale of constraints which would act as a single independent variable. Even though it had been theoretically possible to combine variables relating to a person's mobility level, time availability, attitudes, and storage availability under the unifying concept of constrained behaviour in practice conflicting patterns of behaviour had resulted. Therefore, it did not seem possible to reduce all the independent variables to a single index of constrained behaviour.

Together these results directed the analysis towards the next stage. With the independent variables it was decided to form them into linear combinations, different to those created by multiple regression or principal component analysis, so that the possibility of uncovering a unifying concept other than constrained behaviour could be investigated. With the dependent variables it was also decided to combine them in some way that would express a total meaning in a single variable, because individually they had so far shown themselves incapable of successful prediction. For the dependent variables it was not asking something unrealistic since they were all attempting to measure certain aspects of a single dominating variable which could be described as a 'location selection' variable. Canonical correlation was the chosen technique that allowed the dependent variables to be linearly combined and related to linear combinations of the independent variables. In doing this it would be possible to detect any patterns existing in the independent variables which would provide clues to the presence of any unifying concept.

I. Canonical Correlation.

The input for the canonical correlation analysis consisted of two sets of variables; a set of dependent variables (the proportion of money spent at suburban shopping centres, at local stores, and at the city centre; the number of weekly visits to suburban centres, local stores, and to the city centre; the proportion of money spent on all combined shopping trips; the number of combined shopping trips per week; and the average distance per home based shopping trip) and the sixteen original independent variables (Appendix 6). Basically, the analysis constructed several linear combinations of the dependent variable set and several linear combinations of the independent variable set, it then calculated correlations between all these linear combinations. The **first pair of linear** combinations, called canonical variates, were constructed in such a **way** that the correlation between them was the maximum possible with the existing data. The second **pair** of linear combinations were unrelated to the first and were selected to account for a maximum amount of the relationship between the two sets of variables left unaccounted for by the first pair, and so on.

The results of this analysis were initally very encouraging. The first canonical variate set were reasonably correlated, a canonical correlation coefficient of 0.586 with a corresponding eigenvalue of 0.344 (the square of the correlation coefficient). This eigenvalue showed that 34.4% of the variance in the linear combination of the dependent variable set was explained by the linear combination of the independent variable set. This was the best possible relationship between the two sets of variables. The next best relationship between a pair of linear combinations constructed from the remaining variance produced a canonical correlation coefficient of 0.471 (Eigenvalue of 0.222). The third best relationship produced a canonical correlation of 0.393 (Eigenvalue of 0.155).

The fourth best relationship was insignificant at a 10% level (Chi-square test). Therefore only the first three pairs of canonical variates had together explained a very large proportion of the total variance in the data (72%).

The next step was to see how the linear combinations of both the independent and dependent variables had been constructed. This was achieved by examining the canonical regression coefficients of the individual variables for each of the three pairs of variates. These coefficients indicated the extent to which linear combinations of variables were loading on particular variables; higher coefficients indicated greater loadings. The following table shows the canonical regression coefficients for the first three canonical variates.

CANONICAL COEFFICIENTS.

	1st PAIR OF CAN.VARIATES.	2nd PAIR OF CAN. VARIATES	3rd PAIR OF CAN.VARIATES
DEPENDENT VARIABLES			
Proportion of money spent at Sub. Centres.	0.55*	0.07	-1.03*
Propn. of money spent at Local Centres.	-0.07	-0.27	-1.82*
Propn. of money spent at City Centres.	0.15	0.72*	-1.22*
Number of visits to Suburban centres.	-0.22	0.39	-0.01
Number of visits to Local Ctrs.	0.04	0.96*	0.50
Number of visits to City Ctrs.	-0.48*	-0.16	0.28
Number of combined trips.	0.62*	-0.06	-1.31*
Propn. of money spent on Comb. trips.	0.37*	0.72*	-0.23
Average distance per home based trip.	0.23	-0.23	0.26
INDEPENDENT VARIABLES.			
Size of household.	0.34*	0.42*	-0.16
Presence of a spouse in H/hold	-0.18	-0.35*	0.36*
Presence of Others.	-0.11	0.30*	-0.08
Presence of Children UFTSA	-0.14	0.15	0.48*
Presence of Children at school	0.12	0.16	-0.33
Presence of children at work.	-0.07	-0.03	0.24
Involvement of others in shopping	-0.00	0.10	-0.02
Freezer ownership	0.16	-0.34*	0.15
Age of shopping agent	0.05	0.06	0.26
Social Class of agent	0.21	0.41*	-0.13
Spouse Job Status	0.33*	0.08	0.22
Shopping agent job status	0.50*	-0.08	-0.21
Work status of adults.	0.08	-0.02	-0.08
Mobility of agent	-0.29	0.08	-0.24
Score on Like scale	-0.34*	0.16	0.32*
Score on Satisfaction scale	0.17	-0.42*	-0.79*

Unfortunately this analysis suggested that it was not possible to combine all the dependent variables into a single 'location selection' variable because they had not been evenly loaded on any of the variates. The first variate loaded on the proportion of money spent at suburban centres, on the number of visits to the city centre, on the number of combined trips, and on the proportion of money spent on combined trips. The second variate loaded on the proportion of money spent at the city centre, on the number of visits to local stores, and on the proportion of money spent on combined trips. The third variate loaded on the proportion of money spent at suburban, local and city centres, and on the number of combined shopping trips. These loadings appeared to be very indiscriminate as no logical pattern was revealed. This was also true for the variates constructed from the independent variables. The first variate loaded on the size of household, on the job status of the spouse and shopping agent, and on the score obtained on the Like/Dislike attitude scale. The second variate loaded on the size of household, on the presence of a spouse and others in the household, on the freezer status, on the social class, and on the score obtained for the satisfaction attitude scale. The third variate loaded on the presence of a spouse and children under full time school age in the household, and on the scores obtained from the two attitude scales.

The apparent indiscriminate loadings of the independent and dependent variables had removed any possibility of combining the independent variables under a single unifying concept and had suggested that the dependent variables would be better considered individually.

For these reasons the variates, when taken in pairs, were difficult to interpret. Therefore a further technique was required that would combine the information in all the independent variables in a way, different to those already considered, which would provide good relationships with individual dependent variables.

J. Cluster Analysis.

Cluster analysis would focus attention on the individual shopping agents to see if they could be divided into groups (clusters) each containing agents who were relatively similar to one another on the basis of the information in the set of independent variables. The basic principle of this technique is to create groups, in this case groups of agents, so that within group variance is minimized and between group variance is maximized. However, many sets of groups (clusters) may be established according to this basic principle and if only one set is required then its selection will depend upon a certain amount of subjective reasoning.

The computer program that was used (K. A. Yeomans & P. A. Golder 1977) took as its input the scores from the six variables created by the principal component analysis. The output contained over twenty different cluster arrangements. Only one set of groups was required and it was selected in two stages. First, a Beale test (Beale 1969) was applied to all the cluster arrangements. This test was designed to indicate, by use of an F - test, when a set of $\underline{n}$ groups produced a significantly better clustering arrangement (better in terms of greater between group variance - F test) than a set of $\underline{n + 1}$ groups.

But this test alone was not capable of selecting the best set of groups, it only suggested a range of possibilities. The final decision on which set of clusters to adopt was based on a complete breakdown of all the original variables by each cluster group arrangement. This enabled the most meaningful set of groups to be selected, which was the set containing five groups.

Each of the five cluster groups contained shopping agents possessing a mixture of attributes of any one independent variable, but each group was represented by a predominance of certain attributes. Therefore, members of a group could be stereotyped.

The first cluster group may be portrayed by households containing just two adult members, aged between forty six and sixty years, both working, coming from a 'skilled' social class, not possessing a freezer, the shopping agent having restricted motor car usage and indicating a relative dislike of food shopping.

The second cluster group is represented by households with three or four persons, comprising two adults within the age range twenty six to forty five, one working and one not working, and children at school and/or under full time school age, coming from the 'intermediate' and/or professional social class, possessing a freezer, the shopping agent having unrestricted use of a motor car and indicating a relative dislike of food shopping.

The third cluster group shows a predominance of households containing just two adult members, aged over sixty years, neither working, coming from a 'skilled' social class, not possessing a freezer or a motor car, and the agent indicating a relative liking of food shopping.

The fourth cluster group is depicted by large households
(four or five members) comprising two adults within the age range
twenty six to forty five, one working and one not working, and children
at school and/or under full time school age, coming from the 'skilled'
social class, not possessing a freezer or a motor car, and the agent
indicating a relative dislike of food shopping.

The fifth cluster group may be portrayed by households containing
one adult over sixty years old, not working, coming from the 'skilled'
social class, not possesing a freezer or a motor car, and indicating
a relative liking of food shopping.

The value of this clustering exercise was to be judged by the
ability of the cluster groups to distinguish between certain
behaviour patterns. To this end mean values of all the dependent
variables were calculated for each cluster group. The results were
very encouraging and are reproduced on the following page.

CLUSTER GROUP.	PROPORTION OF TOTAL WEEKLY FOOD EXPENDITURE AT VARIOUS CENTRES.			PROPORTION OF MONEY SPENT ON COMBINED TRIPS PER WEEK %	AVERAGE WEEKLY FOOD EXPENDITURE PER H/HOLD £	NUMBER OF VISITS PER WEEK					(N) SIZE OF CLUSTER GROUPS.
	CITY CENTRE %	SUBURBAN CENTRES %	LOCAL STORES %			TO CITY	TO SUBURBAN CENTRES	TO LOCAL STORES	ON ALL HOME BASED TRIPS	ON ALL COMBINED TRIPS	
CLUSTER 1	5.4	54.2	8.4	32.0	16.99	0.125	1.18	0.659	1.967	2.22	82
CLUSTER 2	2.9	70.0	13.2	13.8	18.58	0.95	1.46	1.079	2.630	0.737	76
CLUSTER 3	18.5	54.8	24.0	2.7	12.43	0.567	1.53	1.825	3.922	0.078	77
CLUSTER 4	9.8	56.6	17.0	16.7	21.61	0.247	1.51	2.444	4.256	1.607	89
CLUSTER 5	14.7	43.3	33.1	8.9	6.92	0.321	1.02	1.643	2.982	0.393	28
F VALUE AT 0.1% SIGN	6.132	3.83	7.112	12.36	34.66	7.982	1.77 Not Significant	8.64	15.20	19.36	

By inspecting the values of the proportion of money spent at various centres and the number of visits to various centres considerable variations between the cluster groups were revealed. To confirm this statistically an F - test was undertaken on each dependent variable to see if there was a significant collective difference between the mean values of the five cluster groups.   All tests were significant at a 1% level except for the 'number of visits to suburban centres' variable. In addition, the five cluster groups were crosstabulated against the period when the main shopping trip was conducted, this also showed wide variation.

PERIOD OF MAIN TRIP %'ges.

	Daytime in Week.	Evening	Saturday	
CLUSTER GROUP 1	45	20	35	100
2	68	16	16	100
3	84	0	16	100
4	70	8	22	100
5	79	0	21	100

Several observations may be made about the variety of behaviour patterns between the cluster groups.

Cluster Group 1. (2 adults working, 46-60, skilled, no freezer, restricted car, dislike shopping).

It was very important for agents in this group to combine shopping with other activities for on average one third of their total food expenditure was undertaken in such a way (largest proportion of all groups). Combined shopping was conducted very frequently but on each occasion relatively fewer items were purchased. On home based trips neither the city centre nor local centres were particularly important for this group. The majority of shopping was conducted at suburban centres. Main shopping trips on Saturdays and during the evenings were particularly important.

Cluster Group 2 (2 adults, one working one not, 26-45, 1 or 2 children at school or under full time school age, Intermediate or Professional, with freezer, unrestricted car, dislike shopping).

In total, agents in this group visited the shops on fewer occasions than agents from any other group. On home based trips food shopping was concentrated at suburban centres and was very infrequent; indicating bulk purchasing. The city centre and local stores were visited almost as often as suburban centres but comparatively little money was spent in either centre.

Cluster Group 3 (2 adults not working, over 60, skilled, no freezer, no car, enjoy shopping)

Agents in this group used all types of shopping centre but concentrated their expenditure at the suburban centres. Visits to local stores were very frequent but the proportion of money spent there was relatively small. Combined shopping was of little or no importance to these agents and collectively they displayed the greatest dependence on weekday shopping.

<u>Cluster Group 4</u>. (2 adults one working one not, 26-45, 2 or 3 children at school and/or under full time school age, skilled, no freezer, no car, dislike shopping).

Agents in this group visited the shops at least fifty per cent more often than any other agents, averaging six trips per week. Also this group produced the highest ratio of visits to expenditure for local store usage (agents visited local stores very frequently but the money spent per visit was the smallest proportion for all agents). As for all other agents suburban centres took the largest proportion of the agent's weekly food expenditure. Finally, combined shopping was a comparatively important method of food shopping for this group. <u>Cluster Group 5</u>. (1 adult, not working, over 60, skilled, no freezer, no car, enjoys shopping).

For these agents the local stores were extremely important shopping centres both in terms of the number of visits and the proportion of money spent. This local store usage severely challenged the supremacy of the suburban centre usage. Most main shopping was undertaken on week days, some on Saturdays, but never during the evenings.

At last it had been possible to successfully relate location selection behaviour to certain groups of individuals. But if this Cluster analysis was to form the basis of a predictive model it was essential that rules were developed which would allocate a new shopping agent to a particular cluster group, thereby facilitating a prediction of the agent's behaviour; discriminant analysis would allow such rules to be developed.

K.   Discriminant Analysis.

This technique was used purely for its classification ability.
With each and every shopping agent allocated to one of the cluster
groups a set of classification functions were derived which would permit
the allocation of new cases with unknown memberships to a cluster. The
functions were weighted linear combinations of the original independent
variables constructed in such a way as to maximize the separation of the
five groups.

Initially all the sixteen original variables were included as
discriminating variables. Also, the known memberships of all the
cases (352) were used to construct the five discriminating functions.
As a check of the adequacy of these functions the original cases were
reallocated to see how many were correctly classified. This was
achieved by calculating five values for each case, one from each
discriminant function. If the value obtained from the first
discriminant function was greater than the values obtained from the
other four functions then the case was assigned to Cluster Group 1.
If the value obtained from the second discriminant function was greater
than the values obtained from the other four functions then the case
was assigned to Cluster group 2, and so on. The results of this check of
adequacy were that, 96.2% of the cases allocated to cluster group 1
were correctly assigned, 94.7% were correctly assigned to cluster group
2, 92.8% were correctly assigned to cluster group 3, 96.6% were
correctly assigned to cluster group 5.

It was felt that inclusion of all sixteen independent variables
as discriminating variables was unnecessary and that adequate
discrimination could have been obtained from a smaller set of variables.

Because the S.P.S.S. program adopts a stepwise procedure for including discriminating variables into the discriminant functions then it was possible to construct five new discriminant functions from the best ten independent variables. The stepwise procedure begins by selecting the single best discriminating variable, a second variable is selected as the variable best able to improve the discrimination with the first variable, and so on. The first ten variables were selected on the basis of the sudden drop in the 'F' value (level of significance for inclusion) from the tenth to the eleventh variable. The ten best variables were, in order of discriminating capability: the number of persons in the household, the presence of a spouse in the household, the presence of members other than a spouse or children in the household, the presence of children under full time school age in the household, the freezer status, the age of the shopping agent, the social class of the household, the spouse's job status, the shopping agent's job status, and the work status of the adult members of the household.

The known memberships of all the three hundred and fifty two cases were used to compute the five discriminant functions (Appendix 9). The check of adequacy in this case produced almost as high a successful prediction rate as when all the sixteen independent variables were used. 88% were correctly assigned to Cluster group 1, 90% to Cluster group 2, 92.3% to Cluster group 3, 83.9% to Cluster group 4, and 100% to Cluster group 5.

It could be argued that successful prediction would be inevitable when the same data is initially used to construct the discriminant functions and then used to be predicted into groups by those functions.

For this reason it was decided to run two independent checks on the procedure for allocating individuals to groups.

The first check involved taking a random sample of shopping agents from the original sample of 352. Half of the agents were selected in this way. Using the known group memberships of these 176 agents, five discriminant functions were computed from all the original sixteen variables. Group memberships of the remaining half of the original sample were then predicted using these functions. 81.8% of the remaining individuals were correctly assigned to cluster group 1, 76.9% to cluster group 2, 70.6% to cluster group 3, 84.6% to cluster group 4, and 100% to cluster group 5; an impressive success rate.

Again a smaller set of discriminating variables were used to create discriminant functions: presence of a spouse in the household shopping agent's job status, presence of children at school, spouse job status, the age of the shopping agent, freezer ownership, and the presence of others in the household. These seven independent variables were again selected on the basis of the drastic change in the 'F' value. In this situation the prediction rate was reduced very slightly: 82.4% were correctly assigned to cluster group 1, 68.4% to cluster group 2, 76.1% to cluster group 3, 75.0% to cluster group 4, and 100.0% to cluster group 5.

The second check of the allocation procedure involved using the subdivision of the survey area into nine zones. Five of the nine zones were used to compute the five discriminant functions and initally all the sixteen variables were used as discriminant variables.

The group memberships of the agents from the remaining four zones were predicted from the functions. 97.2% were correctly allocated to cluster group 1, 84.6% to cluster group 2, 92.3% to cluster group 3, 93.1% to cluster group 4, and 100.0% to cluster group 5. The same procedure was adopted as before and a smaller set of discriminating variables was used. This time there were eight variables: presence of a spouse in the household, presence of children at school in the household, the shopping agent's job status, the spouse job status, freezer ownership, presence of others in the household, age of shopping agent, and social class. In this situation the prediction rate was still very impressive: 94.4% correctly assigned to cluster group 1, 79.5% to cluster group 2, 90.0% to cluster group 3, 78.6% to cluster group 4, and 100.0% to cluster group 5.

Together these two checks of the discriminant analysis procedure for allocating new shopping agents to cluster groups had shown very impressive success rates. Therefore with the known differences in behaviour patterns of the members of the five separate cluster groups it would be theoretically possible to predict the behaviour of any new shopping agent. All that would be required is for the agent to be assigned to one of the cluster groups by applying a set of discriminant functions. The most appropriate functions for this purpose would be those derived from the known memberships of all the cases in the original sample; containing the maximum amount of collected information. Information would be required on only ten independent variables because the discriminating ability of the complete set of sixteen variables showed only a marginal improvement over the best ten. The five relevant discriminant functions are fully described in Appendix 9.

CHAPTER   8

CONCLUSIONS.

The objective of this research was to establish a workable model of retail location which could be applied by both retailers and planners to problems concerned with the site selection of retail outlets within a large urban area. It was envisaged that the ideal shopping facilities for a particular household could be determined by utilizing a 'constraints scale.' If a shopping agent's position on the constraints scale was established then his/her shopping behaviour could have been predicted by referring to the known behaviour patterns of persons who were similarly constrained. In this country residential areas tend to contain households possessing similar constraint characteristics. For example, there are estates containing predominantly old age pensioners or predominantly young married couples with children, and so on. Therefore it would have been a relatively simple process to aggregate the behaviour patterns of shopping agents living in a particular area so that total demand for local, suburban, and/or city centre shopping could have been estimated. However, the constraints scale, as constructed in chapter 5 B, had proved to be an inadequate analytical tool for households within the survey area. The variables that were interpreted as constraint characteristics, although individually displaying significant relationships with some dependent variables, were incapable of being combined under the unifying concept of constrained behaviour. The multiple regression analysis (Chapter 7 H) uncovered a conflict in the theoretical constraint concept which placed doubt upon the idea of an additive nature of constraint characteristics. The conflict being that more constrained agents in terms of some characteristics behave similarly to less constrained agents in terms of other characteristics.

There could be several reasons why the conflict arose, among which is the obvious one that constrained behaviour has nothing whatsoever to do with retail selection decisions. But the reason put forward here is that the theoretical model overemphasized the importance of factors which constrain behaviour by underestimating the influence of factors which induce behaviour (it was hypothesized in Chapter 4 E that retail location selection decisions would be influenced more by factors that constrain behaviour than by factors that induce behaviour), thereby rendering the constraints scale on inadequate interpretation of the theoretical model. For the majority of shopping agents living within the survey area it is very likely that if distance boundaries were constructed for each agent then most boundaries would encompass a wide variety of shopping centres. This would arise because the survey area was provided with many types of shopping facilities easily accessible to all of the resident shopping agents. Even a one hour time element would allow a comparatively constrained agent, one restricted to the bus service, to choose between many local facilities, several suburban centres, and even possibly the city centre itself. In such a situation inducement factors become very important determinants of retail outlet selection. The theoretical model incorporated such factors into the attitude constraint by suggesting that store preferences and shopping method preferences would induce agents to visit certain centres. This would constrain their behaviour by restricting the possible number of centres which an agent could visit. However, the importance of these factors was overlooked when constructing the constraints scale. Attitude constraints were represented only by a measure of an agent's like or dislike of food shopping.

On reflection it is ironic that the survey area was chosen so that agents would be seen to exercise a free choice between a wide variety of centres but this fact in part possibly led to the downfall of the proposed constraints scale. Nevertheless, where retail facilities are more spaciously positioned, as in residential areas located just outside city boundaries, a simple additive form of the constraints scale may prove to be more suitable. This is an area for future research.

While investigating the properties of the constraints scale relationships between retail selection behaviour and certain groups of shopping agents have been suggested. These groups were not formed according to constraint considerations but were formed on the basis of similarities existing in a set of independent variables measured for each shopping agent. The cluster analysis procedure referred to (Chapter 7 J) produced five distinct groups of agents. The groups displayed significantly different expenditure and shopping frequency patterns for city centre, suburban centre, and local store usage. The known behaviour patterns that were established by the sample data (see table in Chapter 7J) could be used to predict the behaviour of other shopping agents living in analogous situations. The profiles of the members of each of the five groups, as established in Chapter 7 J, could be used as a guide to assign any new agent to a group. But if a more rigorous approach was required then membership could be established by applying the five discriminant functions described in Appendix 9 and Chapter 7 H. This latter approach constitutes a complex model of retail selection behaviour that could be applied only to location problems within the suburbs of Birmingham. For application to other cities a new set of discriminant functions would be required because certain peculiarities existing in Birmingham may not prevail in other cities.

For example, the free bus service to old age pensioners.

On balance the research has contributed in many ways to retail location theory. The theoretical model, with a little more emphasis on inducement factors, could provide a framework within which future studies of retail location may be based. Also, the novel way that cluster analysis and discriminant analysis were combined to establish an alternative approach to the constraints scale could be repeated in other studies of retail location. Indeed this approach could even be used to develop new bases for segmenting markets in studies other than retail location.

Finally, it would be advisable to retest an additive scale of constraints at a more relevant level of analysis for it may still prove to be an easy to use analytical tool for planners and developers.

APPENDICES.

APPENDIX 1

A map of the survey area indicating the
positions of shopping centres.

KEY

■	—CITY CENTRE
●	—SUBURBAN CENTRES
•	— LOCAL CENTRES
⌐	— BUS ROUTES
▨	— SURVEY AREA

N

MILES
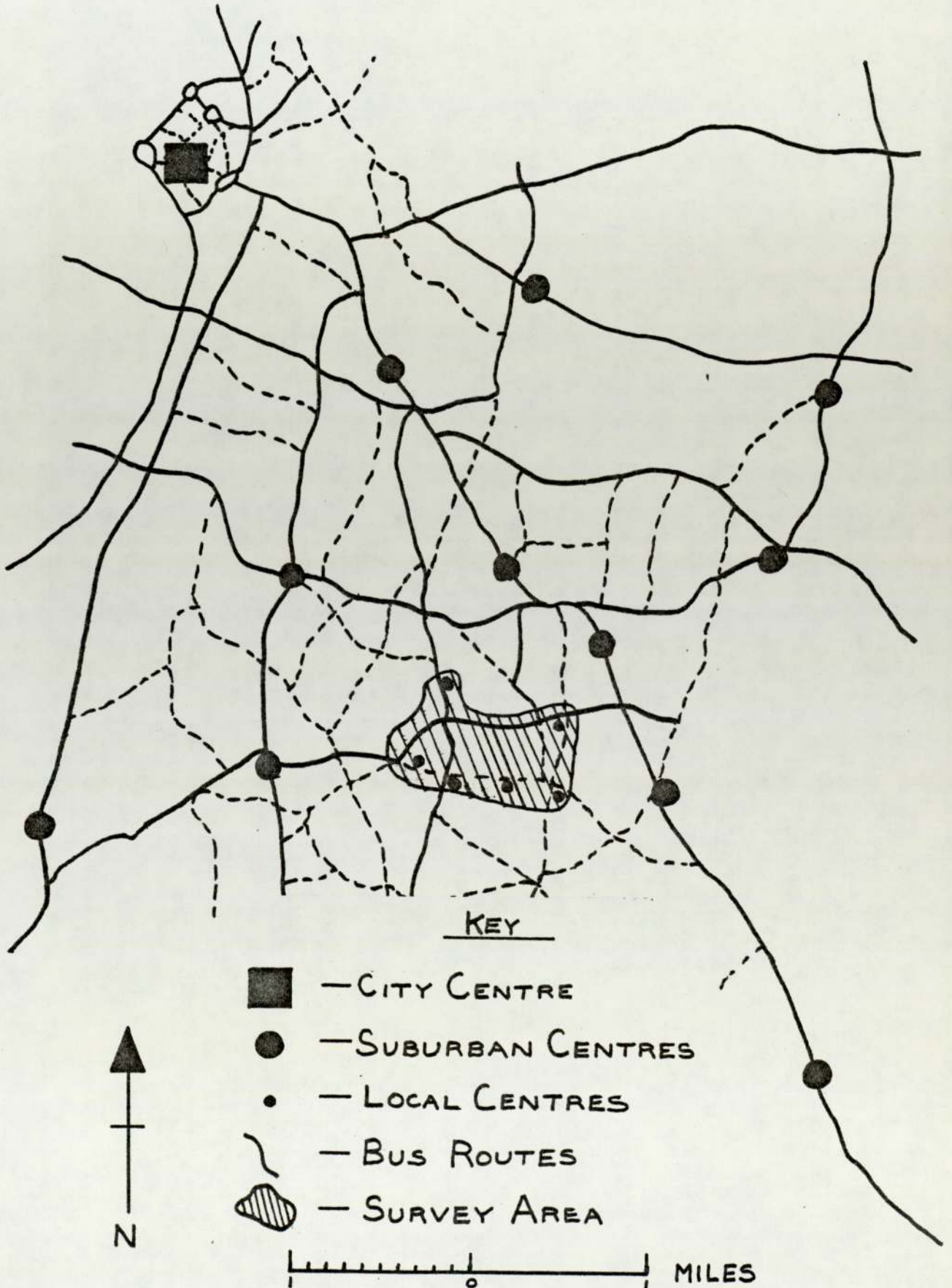
APPENDIX 2.

(1) List of statements tested for the Like/Dislike attitude
   scale.

1. The best part of food shopping is when it is finished and I am back at home.

2. I believe that most food shops are not designed for the needs of people.

3. I can understand that some people find food shopping very enjoyable.

4. In very small doses food shopping is acceptable.

5. Food shopping provides an opportunity for meeting people.

6. Food shopping offers a welcomed change of scenery.

7. Sales assistants in food stores are generally unhelpful.

8. Food shopping brings husband and wife closer together.

9. Food shopping may be considered a hobby.

10. I believe that it is worth the effort to compare quality and prices in food shops.

11. The shops are always closed when it would be best for me to shop for food.

12. I like food shopping because it gives me something to do.

13. Sales assistants in food stores are well mannered and pleasant.

14. There's no skill involved in food shopping.

15. Food shopping is boring because the choice of products never varies.

16. A good housewife enjoys her food shopping.

17. I would rather be doing housework than shopping for food.

18. It is an effort to decide what to buy in the food stores.

19. Carrying shopping bags is crippling.

20. Food shopping is an outdated occupation.

21. Food shopping is a waste of time.

22. Food shops are always difficult to get to.

23. I get a great deal of satisfaction from visiting the food shops.

24. It is always difficult deciding what to buy in the food **stores**.

25. We are living in an age when food shopping is pleasurable.

26. I enjoy visiting food shops because of the friendly atmosphere I find in them.

27. To me food shops are boring places to be in.

28. Food shops are always congested.

29. It is frustrating being confronted with such a wide selection.

30. Food shopping stimulates the mind.

31. It's frustrating being in food shops.

32. I can always find the time for food shopping.

33. The music in the food stores creates a pleasant atmosphere.

34. Profits in food shops are far too high.

35. Food shopping is exciting because there is always something different to choose.

36. Food shopping is a good form of exercise.

37. Food shops are more concerned with making money than providing a service.

38. Food shopping is hazardous in big towns.

39. Food shopping can be very appetizing.

40. There is a favourable trend towards bigger food shops.

41. I love spending money on food.

42. The food shops are full of attractive colours.

43. I need to spend too much time in the food stores in order to select my purchases.

44. I believe food shopping to be a necessary evil.

(2) List of statements tested for the Satisfaction attitude scale.

1. I believe that most food shops are not designed for the needs of people.

2. Sales assistants in food stores are generally unhelpful.

3. The shops are always closed when it would be best for me to shop for food.

4. Sales assistants in food stores are well mannered and pleasant.

5. Food shops are always difficult to get to.

6. I get a great deal of satisfaction from visiting the food shops.

7. I enjoy visiting the food shops because of the friendly atmosphere I find in them.

8. To me food shops are boring places to be in.

9. Food shops are always congested.

10. The music in the food stores creates a pleasant atmosphere.

11. Profits in food shops are far too high.

12. Food shops are more concerned with making money than providing a service.

13. There is a favourable trend towards bigger food shops.

14. My regular food stores charge too much.

15. The food shops are full of attractive colours.

16. The assistants in my regular food stores can never offer any useful advice.

17. Even if my regular food stores were further away I would make the effort to continue to visit them.

18. At my regular food stores I can always purchase the goods I require.

19. The food shops I use are too big.

20. The sales assistants in my regular food stores are more like personal friends.

21. There is always a wide choice of products at my regular food stores.

22. One must always be careful not to get a bad deal at my regular food stores.

23. There is always a friendly welcome at my regular food stores.

24. I find that the prices charged in my regular food stores match my pocket.

25. One is never guaranteed of the quality of goods at my regular food stores.

26. The food stores I visit are really bright and clean.

27. The food shops I use are too small.

28. The food shops I use could not be better located.

29. At my regular food stores I know where to find the goods.

30. The food shops I use should be demolished tomorrow.

31. For me, food shopping facilities have never been better.

32. If circumstances allowed, there are other foodstores that I know of which I would prefer to visit.

33. It is always inconvenient getting to the food shops that I use.

34. I look forward to visiting my regular food stores.

35. It is always good to see familiar faces in the food shops.

36. I need to spend too much time in the food stores in order to select my purchases.

APPENDIX 3

The Likert Attitude Scales – Correlation coefficients between the
i'th statement score and the total score minus the i'th statement
score.

Like/Dislike Scale.

Statement Number.	Correlation.	Statement Number.	Correlation.
1	0.34	23	0.61
2	0.17	24	0.18
3	0.39	24	0.59
4	0.13	26	0.45
5	0.43	27	0.63
6	0.46	28	0.13
7	-0.01	29	-0.09
8	0.29	30	0.47
9	0.39	31	0.51
10	0.24	32	0.40
11	-0.03	33	0.32
12	0.42	34	0.10
13	0.24	35	0.63
14	-0.01	36	0.36
15	0.33	37	0.21
16	0.25	38	0.06
17	0.11	39	0.44
18	0.32	40	0.06
19	0.11	41	0.22
20	0.29	42	0.17
21	0.44	43	-0.01
22	0.16	44	0.40

Satisfaction Scale.

Statement Number.	Correlation.	Statement Number.	Correlation.
1	0.23	19	−0.08
2	0.19	20	0.41
3	0.10	21	0.47
4	0.45	22	0.26
5	0.17	23	0.50
6	0.29	24	0.42
7	0.40	25	0.13
8	0.41	26	0.19
9	0.03	27	0.05
10	0.31	28	0.26
11	0.12	29	0.17
12	0.19	30	0.07
13	0.08	31	0.27
14	0.40	32	0.14
15	0.29	33	0.28
16	0.46	34	0.61
17	0.16	35	0.39
18	0.40	36	0.15

APPENDIX 4

THE QUESTIONNAIRE.

THE UNIVERSITY OF ASTON MANAGEMENT CENTRE.

SHOPPING BEHAVIOUR QUESTIONNAIRE.

                                  A   B

(Interviewer quota control boxes: ☐   ☐)

1.   Do you, or any other member of your household own a
       motor car?

       (If YES code 1 here and continue)
       (If NO code 0 here and go to question 5)

2.   Do you ever use a motor car on FOOD shopping trips, it
       does not matter whether you drive the car or are driven
       by someone else?

       (If YES code 2 here and continue)
       (If NO code 1 here and go to question 5)

3.   Do you have a current full licence to drive a motor car?

       (If YES code 2 here and continue)
       (If NO code 1 here and quota control box A code 2
       and then go to question 5)

4.   Is a motor car avilable for your use at all times
       during the day?

       (If YES code 2 here and quota control box A code 3)
       (If NO code 1 here and quota control box A code 2)

5.   Do you ever use the bus on FOOD shopping trips?

       (If YES code 1 here and continue)
       (If NO code 0 here and go to question 8)

6.   Could you estimate how long it takes you to walk to the
       bus stop from your home? (in minutes).

7.   The last time you used the bus for a food shopping
       trip, how long did you have to wait for it to arrive?
       (in minutes)

8.   Do you feel that the bus service you have available is -
       Very Satisfactory, Satisfactory, Unsatisfactory, Very
       Unsatisfactory.

       (Very Satisfactory or Satisfactory code 1 here and
       quota box A code 1)
       (Unsatisfactory or Very Unsatisfactory code 0 here and
       quota box A code 0).

9A. For how many persons living in this house do you purchase FOOD items, including yourself?

   (If 1 go to question 10)
   (If 2 or more continue with part B)

B. Who are the persons other than yourself for whom you purchase food items? Are they:

     i) Children   (If YES code 2 and ask 9C/If NO code 1)
    ii) Husband (Wife)(If YES code 2 and ask 9D/If NO code 1)
   iii) Others   (If YES code 2/If NO code 1)

C. Are any of the children with you:

     i) Under full-time school age?
       (If YES* code 2/If NO code 1)

    ii) Attending school full-time?
       (If YES* code 2/If NO code 1)

   iii) Working full-time?
       (If YES code 2/If NO code 1)

   *Do you ever take or collect your children from school/ play school?

   (If YES code 2 here and continue)
   (If NO code 1 here and go to 9D or 10)

   *a) When you take or collect your children from school/ play school do you also shop for food items?

   (If YES code 2 here and continue)
   (If NO code 1 here and go to 9D or 10)

   *b) How many times do you shop for food in this way during a typical week?

   *c) How much money would you normally spend on these trips during a typical week? (in £'s)

D. Do you have either a full-time or part time job?

   (If part time code 3, If full time code 2,
   If, NO code 1)

10A. Do you have either a full-time or part-time job outside of the home?

   (If FULL-TIME code 1 here and continue with B)

   if person not married quota box B code 0
   if husband (wife) has FT or PT job quota box B code 0
   if husband (wife) does not have FT or PT job quota box B
     code 1.

   (If PART-TIME job code 2 here and continue with B)

   if person not married quota box B code 0
   if husband (wife) had FT or PT job quota box B code 0.
   if husband (wife) has no job quota box B code 1.

(If NEITHER code 0 here and go to question 11)

· if person not married quota box B code 2
if husband (wife) has FT or PT quota box B code 1
if husband (wife) has no job quota box B code 2.

☐

B. (i) Do you regularly shop for food on the way to or from work or during your lunch hour?

(If YES code 2 here and continue)
(If NO code 1 here and go to question 11)

☐

(ii) How many times do you shop forfood in this way during a typical week?

☐☐

(iii) How much money would you normally spend on these trips during a typical week?

☐☐

11. (If the person lives alone code 0 and go to question 12) Are any of the other members of your household regularly involved in purchasing food items either with or without you?

If YES which members.

(i) Your Husband/(wife) only code 2
(ii) Your Son and/or Daughter only code 3.
(iii) Your Husband/(wife) and Son and/or Daughter code 4.
(iv) Others code 5.

If NO code 1

☐

12. When shopping for food during a typical week which of the following locations do you visit?

(IF Applicable) - Please exclude the (9C*b) shopping trips that occur when you are taking or collecting your children to or from school/play school.

(IF Applicable) - Please exclude the (10B(ii) shopping trips that occur during your lunch hour or when going to or from work.

Do you visit:	(i) No. of visits	(ii) Money spent.
City Centre		
King's Heath Centre		
Solihull		
Moseley		
Hall Green		
Local shops (expand)		
None		
Others (write down)		

(i) How often during a typical week do you shop at each of these locations? (answer above)

(ii) How much money do you spend at each of these locations during a typical week? (answer above)

(Post code)

13. Would you say that you were generally Very Satisfied (code 0) Satisfied (code 1) Partly Satisfied (code 2) Partly Dissatisfied (code 3) Dissatisfied (code 4) Very Dissatisfied (code 5) with the food stores that you regularly visit?

14. When during the week do you regularly conduct your main food shopping trip. The main trip being the one on which you purchase the greatest number of items. Is it on a Saturday (code 2) or during the evening in the week (code 1) or during the daytime in the week (code 0)?

15. What single reason would you give as the most important reason why you may regularly visit a particular food store?

write down...

(post code)

16A. Do you own a food freezer?

(If NO code 0 and go to question 17)
(If YES continue)

B. What type of freezer is it?

Is it one of the smaller types that sit on top of the normal refrigerator (code 1)
OR
Is it one of the larger upright or chest-type freezers (code 2)?

17. I am going to read out a list of statements about food shopping. Would you tell me for each statement whether you Strongly Agree, Agree, Disagree, Strongly Disagree or whether you are Uncertain about the statement.

	SA	A	U	D	SD

Food shopping offers a welcomed change of scenery. +

I like food shopping because it gives me something to do +

Food shopping is a waste of time −

I get a great deal of satisfaction from visiting the food shops +

We are living in an age when food shopping is pleasurable +

I believe food shopping to be a necessary evil. −

Food shopping can be very appetizing +

Food shopping stimulates the mind +

It is frustrating being in food shops −

Food shopping is exciting because there is always something different to choose. +

To me food shops are boring places to be in. −

I enjoy visiting the food shops because of the friendly atmosphere I find in them +

Sales assistants in food stores are well mannered and pleasant +

My regular food stores charge too much −

I look forward to visiting my regular food stores +

The sales assistants in my regular food stores are more like personal friends +

It is always good to see familiar faces in the food shops +

At my regular food stores I can always purchase the goods I require +

The assistants in my regular food stores can never offer any useful advice. −

I find that the prices charged in my regular food stores match my pocket. +

18. Into which of the following categories does your age fall?

are you   i) 25 years or under (code 0)
           ii) Between 26 and 35 (code 1)
          iii) Between 36 and 45 (code 2)
           iv) Between 46 and 60 (code 3)
            v) Over 60 years   (code 4)

19. What is the occupation of the head of the household?

_____

(Ask previous employment if retired or no current work)
(Post code)

20. (Sex of respondent - FEMALE code 0, MALE code 1) ☐

21. (Address of respondent) -   ....

  ....

  ....

  ....

Thank you for your co-operation.

(All questions 'Not Applicable' code 0)

APPENDIX 5

LIST OF TABLES (1-26)

TABLE 1.

CONSTRAINTS SCALE		PROPORTION OF TOTAL FOOD EXPENDITURE SPENT ON HOME BASED TRIPS TO:			AVERAGE NUMBER OF 'HOME BASED' SHOPPING TRIPS PER WEEK.			
		CITY CENTRE %	SUBURBAN CENTRES %	LOCAL STORES %	TO CITY CENTRE	TO SUBURBAN CENTRES	TO LOCAL STORES	TOTAL HOME BASED TRIPS
HIGHLY CONSTRAINED 1	NO CAR ALL WORK	10.6	46.7	13.4	0.23	1.19	1.18	2.60
2	" ONE WORK	9.6	64.4	19.1	0.30	1.98	2.25	4.53
3	" NO WORK	19.2	42.2	35.5	0.58	1.21	2.46	4.25
4	RESTRICTED CAR ALL WORK	4.6	59.6	9.4	0.15	1.16	0.77	2.08
5	" ONE WORK	11.4	58.9	18.7	0.28	1.25	1.77	3.30
6	" NO WORK	12.3	59.1	20.9	0.46	1.81	1.42	3.69
7	UNRESTRICTED CAR ALL WORK	4.5	62.9	6.0	0.07	1.58	0.59	2.24
8	" ONE WORK	1.2	70.3	12.1	0.04	1.52	1.68	3.24
HIGHLY UNCONSTRAINED 9	" NO WORK	17.4	72.9	8.6	0.29	1.33	1.27	2.89

TABLE 2

		PROPORTION OF TOTAL FOOD EXPENDITURE SPENT ON HOME BASED TRIPS TO			AVERAGE NUMBER OF HOME BASED SHOPPING TRIPS PER WEEK		
		CITY CENTRE %	SUBURBAN CENTRES %	LOCAL STORES %	TO CITY CENTRE	TO SUBURBAN CENTRE	TO LOCAL STORES
MOBILITY	NO CAR	14	50	24	0.40	1.41	2.02
	RESTRICTED CAR	8	60	14	0.24	1.27	1.25
	UNRESTRICTED CAR	4	67	9	0.08	1.52	1.13
WORK STATUS	ALL WORK	6	57	10	0.15	1.30	0.85
	ONE WORK	8	64	17	0.26	1.57	1.90
	NO WORK	18	49	30	0.53	1.32	2.15

TABLE 3.

LEVEL ON CONSTRAINTS SCALE		PROPORTION OF TOTAL FOOD EXPENDITURE SPENT ON COMBINED TRIPS. %	%	AVERAGE NUMBER OF COMBINED TRIPS.
NO CAR	ALL WORK	29.3)	)	)
"	ONE WORK.	6.9)	) 12.0)	) 0.98
"	NO WORK.	3.1)	)	)
RESTRICTED CAR	ALL WORK.	26.4)	)	)
"	ONE WORK.	11.0)	) 18.0)	) 1.26
"	NO WORK.	7.7)	)	)
UNRESTRICTED CAR	ALL WORK.	26.6)	)	)
"	ONE WORK.	16.4)	) 20.0)	) 1.21
"	NO WORK.	1.1)	)	)

TABLE 4.

LEVEL ON CONSTRAINTS SCALE		AVERAGE DISTANCE PER TRIP ON HOME BASED TRIPS (MILES)	
NO CAR	ALL WORK	1.23)	
"	ONE WORK.	1.01)	1.15
"	NO WORK.	1.19)	
RESTRICTED CAR	ALL WORK.	1.31)	
"	ONE WORK.	1.20)	1.27
"	NO WORK.	1.33)	
UNRESTRICTED CAR.	ALL WORK.	1.23)	
	ONE WORK.	1.06)	1.19
	NO WORK.	1.48)	

TABLE 5.

AVERAGE SCORE ON THE LIKERT
SATISFACTION SCALE.

*MIN SCORE = 8 (LOW LEVEL OF
SATISFACTION WITH
EXISTING STORES).

MAX SCORE = 40 (HIGH LEVEL OF
SATISFACTION WITH
EXISTING STORES)

ALL WORK	23.9
ONE WORK	25.1
NO WORK.	26.2

*This latest scale consisted of eight statements, four statements being omitted from the original scale on the bais of uneven distribution of answers. If the scale was to measure relative levels of satisfaction for respondents in all constraint groups then each statement should be evenly weighted on the agreement and disagreement responses. Frequency counts for the individual responses of each statement were produced and those which were heavily weighted on either the agreement or disagreement scale were rejected (Note - the same principle was adopted to refine the Like/Dislike scale).

TABLE 6.

		DAYTIME IN WEEK.	EVENING	SATURDAY.		(N)

PERCENTAGE OF ALL RESPONDENTS:
PERIOD OF UNDERTAKING THE
MAIN SHOPPING TRIP

		DAYTIME IN WEEK.	EVENING	SATURDAY.		
NO CAR	ALL WORK.	59.1	11.4	29.5	100%	(44)
"	ONE WORK	77.5	2.5	20.0	100%	(40)
"	NO WORK.	86.9	0	13.1	100%	(61)
RESTRICTED CAR	ALL WORK	35.8	30.2	34.0	100%	(53)
"	ONE WORK	46.7	20.0	33.3	100%	(45)
"	NO WORK.	92.3	0	7.7	100%	(13)
UNRESTRICTED CAR	ALL WORK	70.5	6.8	22.7	100%	(44)
"	ONE WORK	82.9	2.4	14.6	100%	(41)
"	NO WORK.	100.0	0	0	100%	(11)

TABLE 7.

PERIOD OF UNDERTAKING THE
MAIN SHOPPING TRIP (%'GES)

		DAYTIME IN WEEK.	EVENING	SATURDAY		(N)
	NO CAR	76	4	20	100%	(145)
MOBILITY	RESTRICTED CAR	47	22	31	100%	(111)
	UNRESTRICTED CAR	79	4	17	100%	(96)
	ALL WORK	54	17	29	100%	(141)
WORK STATUS	ONE WORK	68	9	23	100%	(126)
	NO WORK	89	0	11	100%	(85)

TABLE 8.

MOBILITY LEVELS OF RESPONDENTS IN EACH SOCIAL CLASS %'GES.

	PROFESSIONAL.	INTERMEDIATE.	SKILLED	PARTLY SKILLED	UNSKILLED.
NO CAR	16	29	44	65	70
RESTRICTED CAR	33	36	30	31	20
UNRESTRICTED CAR	51	35	26	4	10
	100	100	100	100	100
	(49)	(84)	(151)	(58)	(10)

TABLE 9.

WORK STATUS CONDITIONS OF RESPONDENTS IN EACH SOCIAL CLASS %'GES.

	PROFESSIONAL.	INTERMEDIATE.	SKILLED	PARTLY SKILLED	UNSKILLED.
ALL WORK	47	44	32	47	50
ONE WORK	43	40	37	22	20
NO WORK	10	16	31	31	30
	100	100	100	100	100
	(49)	(84)	(151)	(58)	(10)

TABLE 10.

AGE-MOBILITY BREAKDOWN %'GES.

	UNDER 60 YEARS.	OVER 60 YEARS	
NO CAR	65	35	100%
RESTRICTED CAR	82	18	100%
UNRESTRICTED CAR	88	12	100%
(N)	(270)	(82)	

TABLE 11.

AGE – WORK STATUS OF ADULTS BREAKDOWN %'GES.

	UNDER 60 YEARS	OVER 60 YEARS	
ALL WORK	95	5	100%
ONE WORK	88	12	100%
NO WORK	29	71	100%

TABLE 12.

FREEZER OWNERSHIP – MOBILITY BREAKDOWN %'GES.

	NO FREEZER	SMALL FREEZER	LARGE FREEZER	
NO CAR	82	13	5	100%
RESTRICTED CAR	57	17	26	100%
UNRESTRICTED CAR	43	19	38	100%

TABLE 13.

FREEZER OWNERSHIP – WORK STATUS BREAKDOWN %'GES.

	NO FREEZER	SMALL FREEZER	LARGE FREEZER	
ALL WORK	57	17	26	100%
ONE WORK	56	19	25	100%
NO WORK	83	13	4	100%

TABLE 14.

MOBILITY – WORK STATUS BREAKDOWN %'GES.

	NO CAR	RESTRICTED CAR	UNRESTRICTED CAR.	
ALL WORK	31	38	31	100%
ONE WORK	32	36	32	100%
NO WORK	72	15	13	100%

TABLE 15.

MOBILITY	AVERAGE HOUSEHOLD SIZE.
NO CAR	3.0
RESTRICTED CAR	3.3
UNRESTRICTED CAR	3.5

TABLE 16.

WORK STATUS	AVERAGE HOUSEHOLD SIZE.
ALL WORK	3.4
ONE WORK	3.8
NO WORK	2.3

TABLE 17.

CONSTRAINS SCALE	AVERAGE SCORE ON THE LIKE/ DISLIKE SCALE - MIN.SCORE = 11 MAX. SCORE = 55	
NO CAR, ALL WORK	27.3)	
" ONE WORK	29.7)	30.3
" NO WORK	33.3)	
RESTRICTED CAR, ALL WORK	27.2)	
" ONE WORK	28.8)	29.0
" NO WORK	35.8)	
UNRESTRICTED CAR, ALL WORK	26.0)	
" ONE WORK	28.5)	27.0
" NO WORK	28.6)	

TABLE 18.

SOCIAL CLASS	AVERAGE SCORE ON THE LIKE/DISLIKE SCALE – MIN. SCORE = 11 MAX. SCORE = 55.
PROFESSIONAL	27.3
INTERMEDIATE	27.7
SKILLED	30.2
PARTLY SKILLED	29.9
UNSKILLED	29.4

TABLE 19.

SOCIAL CLASS	PERCENTAGE OF HOUSEHOLDS IN EACH CLASS OWNING A FREEZER (LARGE OR SMALL)	AVERAGE SCORE ON THE LIKE/DISLIKE SCALE MIN. SCORE = 8 MAX. SCORE = 40.
PROFESSIONAL	55%	20.0
INTERMEDIATE	40	20.5
SKILLED	34	22.5
PARTLY SKILLED	24	22.1
UNSKILLED*	40*	21.7*

* SMALL SAMPLE N = 10

TABLE 20.

AGE GROUPS OF SHOPPING AGENT.	AVERAGE SIZE OF HOUSEHOLD	PERCENTAGE OF HOUSEHOLDS IN EACH AGE GROUP WITHOUT A FREEZER %'GE	SCORE ON LIKE/ DISLIKE SCALE MIN.SCORE = 8 MAX.SCORE = 40
UNDER 25*	2.8*	87*	20.1*
BETWEEN 26 and 35	3.9	61	19.5
BETWEEN 36 " 45	4.3	55	19.9
" 46 " 60	3.1	52	21.3
OVER 60	1.9	81	25.3

*SMALL SAMPLE N = 15.

TABLE 21.

SIZE OF HOUSEHOLD	SCORE ON LIKE/DISLIKE SCALE MIN. SCORE = 8. MAX SCORE = 40
1	24.6
2	22.1
3	22.2
4	20.0
5	20.1
6	19.4
7*	15.5*
8*	22.0*

*SMALL SAMPLES N = 2 and 7 RESPECTIVELY

FREEZER STATUS	AVERAGE SIZE OF HOUSEHOLD
NO FREEZER .	3.17
SMALL OR LARGE FREEZER	3.43

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TABLE 22.

REMAINING INDEPENDENT VARIABLES.		IMPORTANCE OF TYPES OF CENTRES PROPORTION OF TOTAL FOOD EXP. SPENT ON HOME BASED TRIPS			AVERAGE NUMBER OF HOME BASED SHOPPING TRIPS PER WEEK.			(N)
		TO CITY CENTRE %	TO SUBURBAN CENTRES %	TO LOCAL STORES %	TO CITY CENTRE	TO SUBURBAN CENTRE	TO LOCAL STORES	
FREEZER OWNERSHIP	NO. FREEZER	11.1	54.2	20.1	0.31	1.42	1.7	222
	SMALL	10.6	54.7	15.0	0.27	1.26	2.0	57
	LARGE	4.2	69.7	9.2	0.13	1.44	0.7	73
SOCIAL CLASS	PROFESSIONAL	10.2	64.1	9.8	0.26	1.48	0.76	49
	INTERMEDIATE	7.6	58.0	17.8	0.22	1.39	1.21	84
	SKILLED	9.5	62.3	16.2	0.27	1.56	1.58	151
	PART SKILLED	13.1	41.3	24.2	0.33	1.01	2.50	58
	*UNSKILLED	4.7	41.7	14.5	0.10	0.90	1.80	10*
AGE	*UNDER 25	15.3	50.7	26.7	0.33	0.85	1.80	15*
	26-35	7.6	61.8	13.8	0.19	1.36	1.76	90
	36-45	4.6	58.0	13.1	0.13	1.43	1.21	71
	46-60	6.5	58.4	14.0	0.13	1.56	1.41	94
	OVER 60	18.6	52.4	25.5	0.60	1.34	1.65	82
SIZE OF HOUSEHOLD.	1	14.7	43.3	33.1	0.61	1.02	1.64	28
	2	14.2	53.5	17.8	0.84	1.33	1.08	110
	3	5.8	63.5	18.6	0.31	1.46	2.07	67
	4	4.8	68.5	10.8	0.48	1.53	1.32	79
	5	9.5	52.1	13.8	0.46	1.38	2.04	41
	6	4.5	57.7	19.4	0.38	1.82	2.06	18
	*7	23.7	12.5	0	0.71	1.00	0	2*
	*8	16.8	38.9	12.7	0.49	1.29	1.71	7*

*SMALL SAMPLES.

TABLE 23.

INDEPENDENT VARIABLES.	PROPORTION OF TOTAL FOOD EXPENDITURE SPENT ON WORK COMBINED TRIPS (INCLUDING ONLY THOSE WHO COMBINE WORK WITH SHOPPING – 78) %'GE	N	PROPORTION OF TOTAL FOOD EXPENDITURE SPENT ON CHILD COMBINED TRIPS (INC. ONLY THOSE WHO COMBINE SHOPPING WITH CHILD RELATED ACTIVITIES – 45) %'GE	N
FREEZER OWNERSHIP				
NO FREEZER	49.8	42	46.7	25
SMALL FREEZER	41.7	17	41.4	10
LARGE FREEZER	37.0	19	52.9	10
SOCIAL CLASS				
PROFESSIONAL	27.5	15	72.6	5
INTERMEDIATE	48.1	19	43.5	11
SKILLED	41.9	26	38.2	19
PARTLY SKILLED	54.2	15	53.2	8
*UNSKILLED	90.9	3	58.8	2*
AGE.				
* UNDER 25	33.4	3	10.7	1*
26–35	44.7	14	42.4	21
36–45	41.8	23	54.3	14
46–60	48.1	34	43.9	8
*OVER 60	44.4	4	100.0	1*

*SMALL SAMPLES.

TABLE 24.

	AVERAGE DISTANCE PER HOME BASED SHOPPING TRIP (MILES)	N
FREEZER OWNERSHIP.		
NO FREEZER	1.10	222
SMALL FREEZER	1.26	57
LARGE FREEZER	1.46	73
SOCIAL CLASS.		
PROFESSIONAL	1.36	49
INTERMEDIATE	1.29	84
SKILLED	1.11	151
PARTLY SKILLED	1.20	58
UNSKILLED	1.04*	10*
AGE.		
UNDER 25.	1.29*	15*
26-35	1.00	90
36-45	1.27	71
46-60	1.20	94
OVER 60	1.34	82
SIZE OF HOUSEHOLD.		
1	0.98	28
2	1.05	110
3	1.27	67
4	0.93	79
5	0.95	41
6	0.51	18
7	2.05*	2*
8	1.72*	7*

*SMALL SAMPLES.

TABLE 25.

SIZE OF HOUSEHOLD.	AVERAGE NUMBER OF ALL SHOPPING TRIPS PER WEEK.	N
1	3.38	28
2	3.64	110
3	4.62	67
4	4.11	79
5	5.57	41
6	6.24	18
*7	5.00	2*
*8	6.29	7*

* SMALL SAMPLE.

TABLE 26.

CONSTRAINTS SCALE CONTAINING ONLY RESPONDENTS IN THE SKILLED SOCIAL CLASS.		PROPORTION OF TOTAL FOOD EXPENDITURE SPENT ON HOME BASED TRIPS: %'GES.			N (151)
		AT CITY	AT SUBURBAN CR.	AT LOCAL STORES.	
NO CAR	ALL WORK	0	68.9	9.7	14
"	ONE WORK	6.5	68.3	17.3	20
"	NO WORK	19.8	47.2	31.8	33
RESTR.CAR	ALL WORK	2.5	72.8	2.7	18
"	ONE WORK	8.8	60.6	16.8	19
"	NO WORK	16.4	62.7	20.8	8
UNRESTR.CAR	ALL WORK	6.9	59.3	3.8	17
"	ONE WORK	2.1	76.0	14.0	17
"	NO WORK	30.0	50.5	16.9	5
WORK	ALL WORK	3.3	66.9	5.1	49
STATUS	ONE WORK	5.9	68.0	16.2	56
ONLY	NO WORK	20.2	50.9	24.3	46
MOBILITY	NO CAR	11.7	57.9	22.8	67
STATUS	RESTR.	7.7	65.8	11.9	45
ONLY	UNRESTR.	7.8	65.5	9.9	39

APPENDIX 6.

LIST OF INDEPENDENT VARIABLES.

CODING SCHEME.

SIZE OF HOUSEHOLD — CONTINUOUS VARIABLE.

PRESENCE OF A SPOUSE IN HOUSEHOLD — (2)YES (1) NO (0) NOT APPLICABLE.

PRESENCE OF PERSON/S OTHER THAN SPOUSE OR CHILDREN. — (2) YES (1) NO (0) N.A.

PRESENCE OF CHILDREN UNDER FULL TIME SCHOOL AGE — (2) YES (1) NO (0) N.A.

PRESENCE OF CHILDREN AT SCHOOL — (2) YES (1) NO (0) N.A.

PRESENCE OF CHILDREN WORKING. — (2) YES (1) NO (0) N.A.

INVOLVEMENT OF OTHERS IN SHOPPING — (5) OTHERS (4)SPOUSE, SON & DAUGHTER (3) SON & DAUGHTER SPOUSE ONLY (1) NONE (0) N.A.

FREEZER OWNERSHIP. — (2) LARGE FREEZER (1) SMALL FREEZER (0)NO FREEZER.

AGE OF SHOPPING AGENT. — (4) OVER 60 (3) 60-46 (2) 45-36 (1) 35-26 (0) UNDER 25

SOCIAL CLASS — (1) PROFESSIONAL (2) INTERMED. (3)SKILLED (4) PART SKILLED (5) UNSKILLED.

SCORE ON LIKE/DISLIKE SCALE — CONTINUOUS – HIGH SCORE = RELATIVE LIKING FOR SHOPPING.

SCORE ON SATISFACTION SCALE* — CONTINUOUS – HIGH SCORE = RELATIVE SATISFACTION.

SPOUSE JOB STATUS — (3) FULL TIME JOB (2) PART TIME JOB (1) NO JOB (0) N.A.

SHOPPING AGENT'S JOB STATUS — (2) FULL TIME JOB (1) PART TIME JOB (0) NO JOB.

WORK STATUS OF ADULTS OF HOUSEHOLD — (3) ALL ADULTS WORK (2) ONE ADULT WORKS ONE DOES NOT. (1) NEITHER WORK.

MOBILITY OF SHOPPING AGENT. — (3) NO CAR (2)RESTRICTED CAR (1) UNRESTRICTED CAR.

* Because of the high correlation with the score on the Like scale it was decided to use the Satisfaction scale as an independent variable to support the Like scale.

APPENDIX 7.

BREAKDOWN OF THE INDEPENDENT VARIABLES CREATED BY THE PRINCIPAL
COMPONENT ANALYSIS.

1 - FACTOR 1 - SIZE OF FAMILY STRUCTURE VARIABLE
   COMBINATION OF THE FOLLOWING ORIGINAL VARIABLES:
   SIZE OF HOUSEHOLD, PRESENCE OF CHILDREN UNDER FULL
   TIME SCHOOL AGE, PRESENCE OF CHILDREN AT SCHOOL,
   PRESENCE OF CHILDREN AT WORK.

2 - FACTOR 2 - WORK STATUS VARIABLE
   COMBINATION OF THE FOLLOWING ORIGINAL VARIABLES:
   SHOPPING AGENT'S JOB STATUS, WORK STATUS OF THE
   ADULTS OF THE HOUSEHOLD.

3 - FACTOR 3 - INVOLVEMENT VARIABLE
   COMBINATION OF THE FOLLOWING ORIGINAL VARIABLES:
   INVOLVEMENT OF OTHERS IN SHOPPING, PRESENCE OF PEOPLE
   OTHER THAN SPOUSE OR CHILDREN.

4 - FACTOR 4 - ATTITUDE VARIABLE
   COMBINATION OF THE FOLLOWING ORIGINAL VARIABLES:
   SCORE ON LIKE/DISLIKE SCALE, SCORE ON SATISFACTION
   SCALE.

5 - FACTOR 5 - AGE FAMILY STRUCTURE VARIABLE
   COMBINATION OF THE FOLLOWING ORIGINAL VARIABLES:
   PRESENCE OF A SPOUSE, SPOUSE JOB STATUS, AGE OF
   SHOPPING AGENT.

6 - FACTOR 6 - AFFLUENCE VARIABLE
   COMBINATION OF THE FOLLOWING ORIGINAL VARIABLES:
   FREEZER OWNERSHIP, SOCIAL CLASS, MOBILITY LEVEL
   OF SHOPPING AGENT.

APPENDIX 8.

CORRELATION COEFFICIENTS BETWEEN THE PRINCIPAL COMPONENTS (INDEPENDENT VARIABLES) AND THE SET OF ORIGINAL DEPENDENT VARIABLES.

DEPENDENT VARIABLES.	1 SIZE FAMILY STRUCTURE	2 WORK STATUS	3 INVOLV-MENT.	4 ATTITUDE	5 AGE FAMILY STRUCTURE	6 AFFLUENCE
PROPORTION OF MONEY SPENT AT CITY	0.130	-0.177	0.031	0.033	-0.181	0.151
NO. OF VISITS TO CITY PER WEEK.	0.148	-0.222	-0.003	-0.006	-0.193	0.166
PROP.MONEY SPENT AT SUBURBAN CTRS.	-0.094	0.013	0.020	0.100	0.200	-0.233
NO. OF VISITS TO SUBURBAN CTRS.P.W.	-0.107	-0.057	0.030	0.026	0.075	-0.039
PROP. MONEY SPENT AT LOCAL STORES	0.128	-0.274	-0.066	-0.269	-0.234	0.243
NO. OF VISITS TO LOCAL STORES P.W.	-0.108	-0.268	0.058	-0.099	-0.084	0.233
PROP. MONEY SPENT ON WORK COMB.TRIPS	0.110	0.501	-0.042	0.024	0.050	-0.023
NO. OF WORK COMBINED TRIPS P.W.	0.059	0.553	0.013	0.089	0.082	-0.035
PROP. MONEY SPENT ON CHILD COMB.TRIPS	-0.285	-0.066	0.067	0.108	0.094	-0.043
NO. OF CHILD COMBINED TRIPS P.W.	-0.343	-0.047	0.079	0.119	0.109	0.054
AVERAGE DISTANCE FOR TRIP	0.059	0.022	0.043	0.117	-0.001	-0.108
TOTAL NUMBER OF TRIPS	-0.274	-0.044	0.116	0.039	0.024	0.235

APPENDIX 9.

THE DISCRIMINANT FUNCTIONS DERIVED FROM THE KNOWN MEMBERSHIP OF
352 CASES AND UTILIZING THE TEN BEST DISCRIMINATING VARIABLES.

LET:

The number of persons in the household	=	V1
The presence of a spouse in the household	=	V2
The presence of members other than a spouse or children	=	V3
The presence of children under full time school age	=	V4
The freezer status of the household	=	V5
The age of the shopping agent	=	V6
The social class of the household	=	V7
The spouse's job status	=	V8
The shopping agent's job status	=	V9
The work status of the adult members of the household	=	V10

(The coding pattern of these variables is as shown in Appendix 6)

THEN:

Disc Function 1 = 0.04 (V1) + 58.93 (V2) + 25.94 (V3)

$$+ 7.53 \text{ (V4)} - 0.69 \text{ (V5)} + 2.38 \text{ (V6)} + 4.15 \text{ (V7)}$$

$$- 14.79 \text{ (V8)} - 8.08 \text{ (V9)} + 21.68 \text{ (V10)} - 88.08$$

Disc Function 2 = 1.05 (V1) + 60.97 (V2) + 26.32 (V3) + 10.02 (V4)

$$+ 1.23 \text{(V5)} + 1.51 \text{ (V6)} + 2.44 \text{(V7)} - 14.38 \text{ (V8)}$$

$$- 12.76 \text{ (V9)} + 22.07 \text{ (V10} - 91.76$$

Disc Function 3 = $-0.36(V1) + 63.37(V2) + 27.75(V3) + 6.80 (V4)$

$\qquad -2.08(V5) + 3.33(V6) + 4.27(V7) - 16.13 (V8)$

$\qquad -11.33(V9) + 18.6(V10) - 87.73$

Disc Function 4 = $1.71(V1) + 62.96(V2) + 25.50 (V3) + 9.68(V4)$

$\qquad - 2.26(V5) + 1.06(V6) + 4.47(V7) - 15.41(V8)$

$\qquad - 13.65(V9) + 22.60(V10) - 96.72$

Disc Function 5 = $0.47(V1) + 6.08(V2) + 0.99(V3) + 0.48 (V4)$

$\qquad - 0.98(V5) + 3.63(V6) + 3.56 (V7) - 3.30(V8)$

$\qquad - 4.28(V9) + 10.86 (V10) - 20.25$

NOTE:

Values are calculated for every discriminant function for each new individual. If the value obtained from function one is greater than the values from any other function then the individual is assigned to Cluster Group 1. If the value obtained from function two is greater than the values from any other function then the individual is assigned to Cluster Group 2, and so on.

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