

THE USE AND APPLICATION OF USER SEGMENTATION FOR THE MARKETING OF URBAN PUBLIC TRANSPORT SERVICES: A CASE STUDY OF WEST YORKSHIRE, UK

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Notes

1. The authors would like to record their thanks to Dr A M Hay, Reader in Geography, University of Sheffield, UK for assistance in the preparation of this paper and a similar paper currently being prepared for a research journal.
2. We should also like to thank the West Yorkshire Passenger Transport Executive (WYPTE) for their continued support for the research project from which this paper has developed. Any views expressed in the paper do not necessarily represent those of the officers or policies of WYPTE.

The National and Local Context

Within an expanding market for personal travel, the share of public transport has declined from 57% of total passenger kilometres travelled in 1955 to just over 15% in 1983. The share of this market taken up by bus and coach travel has declined both absolutely and relatively, and was only around 8% of total passenger kilometres in 1983. The causes of decline are varied and complex. One of the main contributors of course has been rising levels of vehicle ownership yet in 1983, 39% of households in the UK did not have a car available for regular use; this statistic was significantly higher in metropolitan areas. A second factor has been the upward trend in real fares which from 1973 to 1983 increased by over 30% more than the rate of inflation. Other explanations which have been put forward are the increase in unemployment (especially in urban areas) and the decline in quality/frequency of service provided. Various econometric models have sought to assess the relative importance of these and other variables. (1)

Nevertheless, the bus does provide an essential means of transport for the urban population. The National Travel Survey (1978/79) clearly indicated substantial groups who were dependent on the bus (eg. persons in non-car owning households, those excluded from owning a car on the grounds of age, income or personal choice) and groups who relied heavily upon the bus for certain journeys (eg. peak trips made by car owners to work, by their families to school or off-peak trips made for shopping purposes). (2) The bus also has a more general role to play in achieving land use planning objectives in urban areas.

Although currently under critical review, the direct subsidisation of urban bus services in the UK has sought to reduce the rate of decline and safeguard services for those groups referred to above. In 1982/83, revenue support accounted for 32% of Passenger Transport Executives' income and concessionary fares payments took the overall level of support to around 45% of total operating costs. Yet despite an escalation of external financial support, nationally, the number of passenger journeys in 1982 was 30% below the level of 1972. (See

Annex 1, Buses White Paper for a full analysis of facts and figures). (3)

The area studied lies within the metropolitan county of West Yorkshire which has a population of just over 2 million. Geographically, the county is diverse in structure - substantial urban concentrations such as Leeds and Bradford are set alongside rural areas such as the Calder and Aire valleys. (See Figure 1). In 1981 47.4% of households were without a car, and as Figure 2 indicates up to 1983, the county had experienced a steady decline in passengers carried on its public transport network. It is therefore reasonably typical in a transport sense of most UK urban areas.

Since April 1st 1974, public transport services have been operated by the West Yorkshire Passenger Transport Executive (WYPTE), which is directly responsible for the majority of stage carriage bus services in its designated area. Most of the remaining services are operated by subsidiaries of the National Bus Company (NBC) and subject to the control of the West Yorkshire Metro National Company, a subsidiary of WYPTE. Key operating statistics for WYPTE are shown in Figure 3. Significantly, since 1980/81, important policy changes have produced a marked effect on the spiral of decline. Patronage has started to rise, real fares and operating costs have fallen. The main explanation for this success has been an enlightened fares policy, involving the integrated development of new tickets, an off-peak fares policy and the general marketing of the network. (See Figure 4) WYPTE has been at the forefront of new initiatives in these fields. In particular the level of pre-payment for tickets using a variety of ticket types, has risen significantly, especially for peak period trips. As the Director General of WYPTE has concluded, expenditure on marketing can yield revenue of up to four times its cost and "a significant contribution is earned both financially and socially from county-wide marketing". (4) Successful marketing has enabled WYPTE to achieve its corporate objectives and remain cost-effective in order to protect its situation in a market place which will be increasingly competitive following deregulation in October '86. (5)

Marketing Public Transport

Within the context identified above the value of marketing and market research in public transport is now firmly established. The current uncertainty facing public transport in the UK means that it is necessary for the industry to become consumer rather than production/supply orientated. A considerable amount of data collection has been carried out by most operators but little of this effort can be said to have been inspired by strict marketing considerations. A notable early exception was the National Bus Company's Market Analysis Project which sought to provide an information input to marketing as well as operational decisions. (6) Elsewhere, the collection of data was motivated primarily by operational considerations. The present economic and political climate in which UK public transport is required to function, as outlined above, has led an increasing number of operators to consider adopting a much more aggressive marketing stance. In many cases this has meant taking on board a set of practices and procedures which although commonplace in USA transport operations, have previously been a feature mainly of private sector organisations in the UK.

Figure 1 : West Yorkshire Conurbation

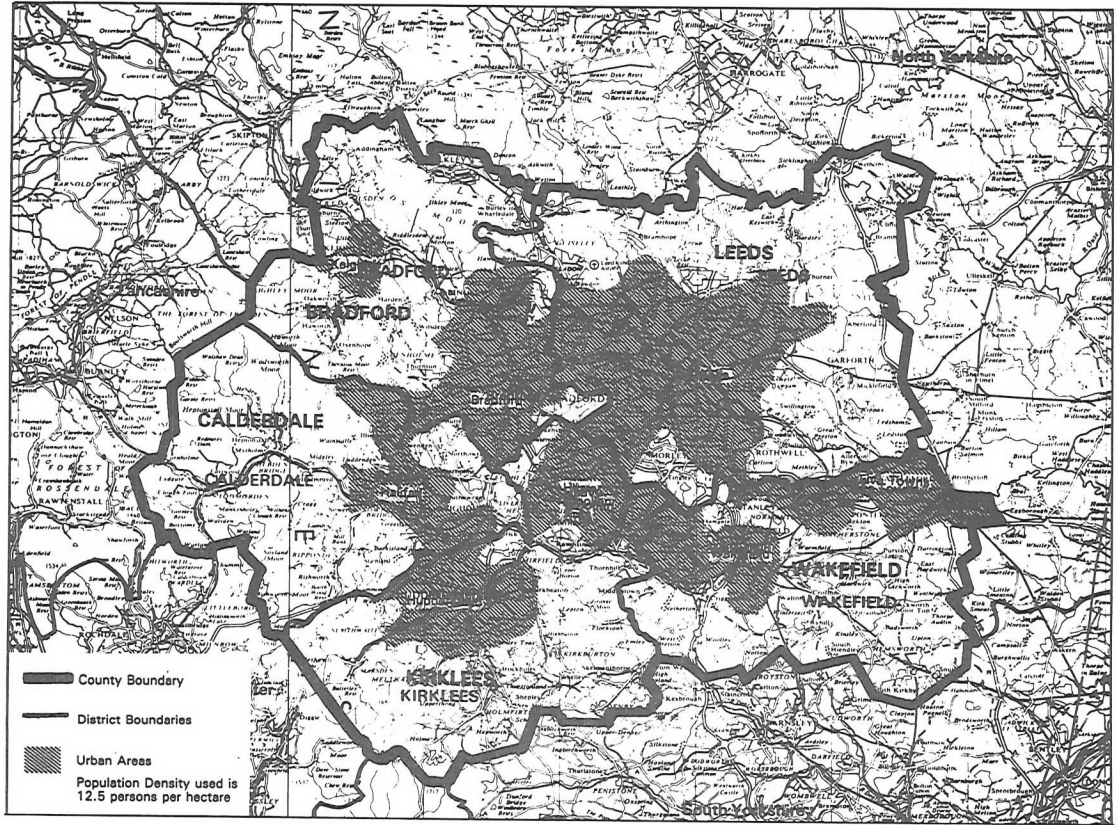
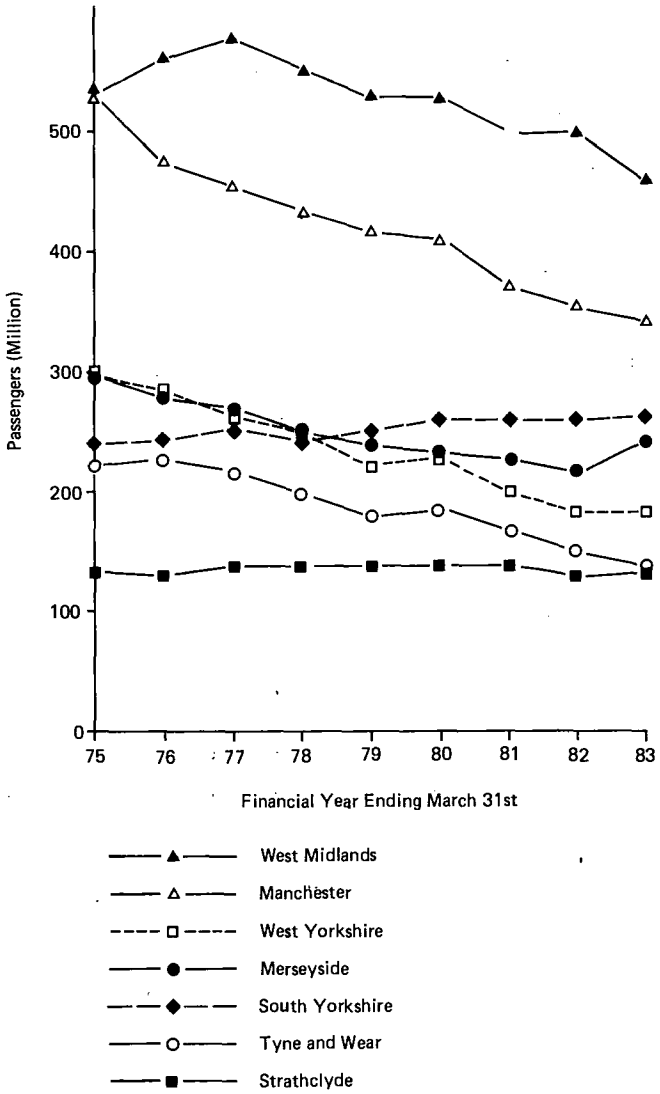
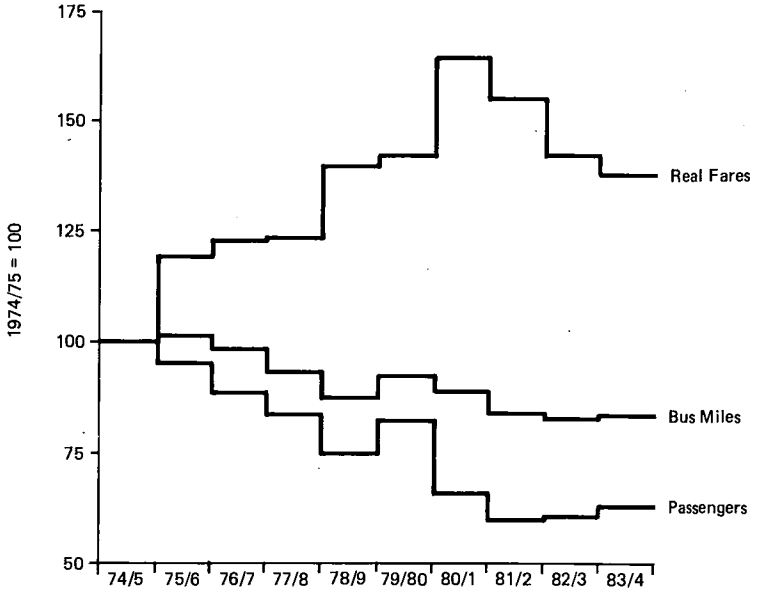


Figure 2: UK Passenger Transport Executives' Direct Operations, 1975-1983



Source: Annual Reports of PTE's

**Figure 3 : WYPTE Fares, Services and Patronage in West Yorkshire
1974/75 – 1983/84**



WYPTE Unit Costs 1974/75 – 1983/84

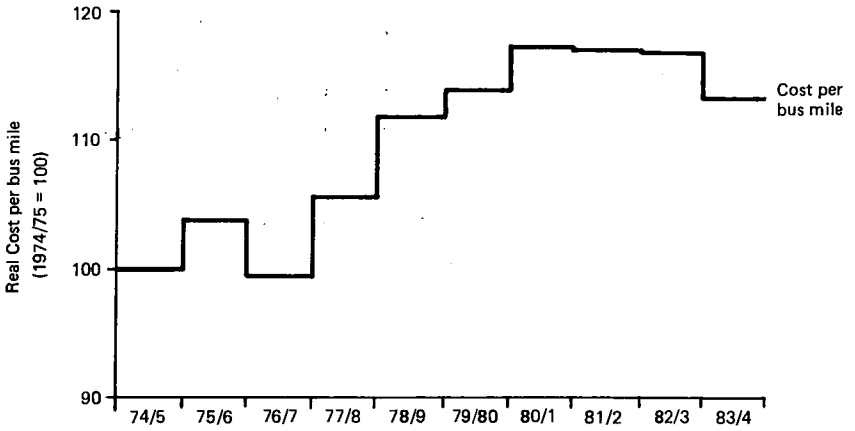


Figure 4: A Typical Press Advert for Saverstrip

POPULAR SAVERSTRIP TICKETS

| Saver-Strip Cost | Normal Fare | You Save | Saver-Strip Cost | Normal Fare | You Save |
|--------------------|-------------|----------|--------------------|-------------|----------|
| 50p | £1.00 | £0.50 | 10p | £1.00 | £0.90 |
| (twelve 10p rides) | | | (twelve 10p rides) | | |
| £1.00 | £1.20 | £0.20 | 20p | £4.00 | £2.80 |
| (twelve 10p rides) | | | (twelve 20p rides) | | |
| £1.50 | £1.80 | £0.30 | 30p | £5.00 | £3.00 |
| (twelve 15p rides) | | | (twelve 30p rides) | | |
| £2.00 | £2.40 | £0.40 | 40p | £6.00 | £4.00 |
| (twelve 20p rides) | | | (twelve 40p rides) | | |
| £2.50 | £3.00 | £0.50 | 50p | £7.00 | £4.50 |
| (twelve 25p rides) | | | (twelve 50p rides) | | |

SaverStrip is the quicker, simpler, cheaper way to travel by bus in West Yorkshire. Remember, a SaverStrip gives you 12 trips for the price of 10—whatever your journey costs. SaverStrips are easy to use, undated and transferable, which means you or your family can use a ticket at any time! And here's even more good news. Due to popular demand, most of our range of SaverStrip values are now available from sales outlets where you see the SaverStrip sign, including Post Offices, Newsagents or MetroBus Sales Offices. Simply ask your nearest outlet if he has the value you require (see table) and he'll make sure that it can be obtained for you. So don't forget, next time you're going to work, to the shops or even to school, Ker-Ching it and save time and money too!

-A-SAVERSTRIP!
MetroBus
 Pay before you travel-it's cheaper.

There exist several formal definitions of marketing . The British Institute of Marketing has formulated the following:

"Marketing is the management function which organizes and directs all those business activities involved in assessing and converting customer purchasing power into effective demand for a specific product or service and in moving the product or service to the final customer or user so as to achieve the profit target or other objectives set by the company." (7)

The peculiarities of the "public transport product" dictate that care is required in the transfer and application of marketing concepts.(8) The demands facing the operator are diverse. Some services will be commercially viable, others operated for social welfare reasons. Within any one area ,there will a range of operating environments eg. urban, suburban, rural. In addition there will also be a considerable variation in customer demand eg. individual, family, business, education, shopping etc. There are then a large number of practical combinations and permutations which may shape the final product.

In the USA, major operators such as Greyhound Lines have made marketing a key aspect of flexible management to cope with recent deregulation and patronage decline.(9) In the UK, several marketing innovations have been forthcoming in response to changing political, economic and transport environments. The introduction of a marketing approach has been crucial in the success, for example, of National Express services.(10) The Bus & Coach Council as the trade association of UK bus operators has been instrumental in the marketing of bus services.(11) Further examples at the metropolitan and also at the local scale are identifiable.(12)

A feature of many of these initiatives is the need to identify homogeneous sub-markets via techniques of market segmentation which can then be targetted more specifically. Segmentation of the market permits the development of products tailored to the needs of specific sub-groups of customers rather than producing for the "amorphous" market and hence it allows for more accurate and effective marketing decisions to be made.(13) A market segment may be defined as:-

"...a subset of the market having specific characteristics that distinguish it from other population groups..." (14)

Although a wide variety of methodologies of segmentation have been developed for many applications, it is important that the resulting segments are meaningful. To be useful segments must exhibit measurability, accessibility and substantiality.(15)

One of the earliest attempts to apply segmentation to public transport was made by Sen and Benjamin and the same authors have reviewed the growing literature to 1981.(16,17) In UK public transport various strategies for segmenting the market have been in operation for some time. These include charging by distance, concessionary fares and differential charging by time of day. The development of these strategies has been primarily due to the intuition of operators rather than as a direct consequence of market research. With regard to published market segmentation analyses in transport, nearly all evidence refers to US studies.

In fact an extensive literature survey has revealed only one such UK-based study, that by Shaw in relation to the market for air transport services.(18) The formal identification of sub-markets by research should not be seen as an end in itself but as a means of generating information which can be applied in four main ways:

- (1) Predictions or forecasts for each sub-market independently. Such disaggregate forecasts may well be more accurate than simple global forecasts especially if the populations lying behind the sub-markets are themselves changing in relative or absolute magnitude. For example, if unemployed persons constitute a distinct sub-market and represent an increasing proportion of the population, public transport usage may well change more rapidly than observation of global patronage trends would indicate.
- (2) If the needs and preferences of the sub-market are distinctive, its identification will assist public transport planners to design a product (type of vehicle, timetabling, routes, ticket types) appropriate to that sub-market.
- (3) It may be worthwhile to consider promotional campaigns (leaflets, posters, TV commercials) aimed at specific sub-markets.
- (4) It may be possible to price the service differentially for each sub-market, although this is usually only possible if members of the sub-market can be isolated in a politically and socially acceptable way (eg. by time of day).

Each of these elements can then be fed into the marketing process and a corporate strategy developed against which patronage trends can be evaluated.

It follows from this discussion that market segmentation not only asks "Does this market have identifiable segments or sub-markets?", but also "Are the sub-markets so identified, useful for prediction, product design, publicity and pricing?" It is also possible that the "best" segmentation in a theoretical sense may be incapable of useful application, although an "inferior" segmentation may be preferred because of its usefulness.

DATA

The data available for segmentation analysis are important because they influence the choice of technique for segmentation and the results of the exercise. Typically, public transport surveys generate a mixture of nominal, ordinal and interval data which thus restricts the range of analytical procedures possible. The eventual choice of technique employed is commonly a compromise between statistical sophistication, simplicity in application and interpretation, robustness and reliability of the results. In this study, the data were derived from a weekday on-vehicle survey of bus passengers on a representative sample of routes during Autumn 1983 in the Huddersfield area of Kirklees Metropolitan District, West Yorkshire. The data collection was carried out by staff employed by West Yorkshire Passenger Transport Executive, the public transport operator, who gave their full support to the study. A self-completion questionnaire

based on a "scratch-out" principle similar to that featured on lottery cards and promotional tickets, was used to collect information from passengers on board buses (See Figure 5). This method proved very successful in what is clearly a difficult working environment for data collection and in itself has attracted considerable interest from other transport operators and market researcher businesses.(19) An overall coverage rate of 90% of passengers and a response rate of 95% of this total were achieved. Consequently, the data collected for statistical analysis is reliable and not subject to biases recognised with other methods of on-vehicle data collection.(20)

In order for the segmentation to be meaningful the information requirement meant that the variables used had to relate to those travel and personal characteristics of passengers likely to yield "actionable" data. The variables used are shown in Figure 5. In total 4210 questionnaires were returned by passengers, of which 3213 contained complete information. This represents an estimated sampling fraction of 6.3% of the sampled market. Frequency distributions and cross-tabulations were created in the traditional style of such surveys but it was felt more detailed relationships between variables was not being revealed by this method.

THE SEGMENTATION TECHNIQUE ADOPTED - Association Analysis
Association analysis is a technique applied initially to studies of plant ecology, in which vegetation sites were described in terms of the presence or absence of indicator species.(21) In general, it can be used to classify individual items (in this case passenger trips) in terms of qualitative characteristics (sex, trip purpose, ticket type). The technique involves the construction of contingency tables between pairs of characteristics as shown in Figure 6. In this table the cells represent the frequency count of individuals having a particular pairing of characteristics. The technique then calculates the Chi-square statistic (X^2), for the table.(22) The value of X^2 will approach zero when there is no relationship between the two characteristics, but will have a high value if the characteristics are either positively associated (ie. often found together), or negatively associated (seldom found together). Such a table is formed for every pairing of characteristics and a table of the resulting X^2 values is constructed. Figure 7 shows an illustration of a table for six characteristics.

The sum of the X^2 values for each characteristic (ie. the raw sum) is then calculated and the characteristic with the largest total X^2 is chosen to split the dataset into two subsets on the basis of presence or absence of that characteristic. In most cases the characteristic used will reflect both positive and negative associations but in some cases it will be preponderantly positive (ie. similarity based) or negative (ie. dissimilarity). The procedure is repeated for each of the subsets, and subsequently for subsets of subsets, being terminated when "sufficient" subsets have been identified, when subsets become too small for useful interpretation, or when the X^2 values cease to be significant.

The results of the analysis therefore form a classificatory tree or dendrogram dividing the original data by a sequence of steps such that the final subsets (in this case market segments) can be

Figure 5. Survey Questionnaire and Variables

| PLEASE ANSWER ALL EIGHT QUESTIONS | | | | | | | | | | OFFICE USE ONLY | | |
|--|--|-------------------|--------|------------------------|------------------|----------------------------|-------------|----------------------------|------|--------------------------|--------------------------|--------------------------|
| 1 | What is the MAIN PURPOSE OF THIS JOURNEY? → | TO FROM WORK | | IN COURSE OF WORK | | EDUCATION | | PERSONAL BUSINESS | | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | SHOPPING | | ENTERTAINMENT OR SPORT | | VISIT FRIENDS OR RELATIVES | | EATING OR DRINKING | | | | |
| 2 | How many times do YOU make THIS journey in THIS DIRECTION each week? → | less than once | | 2 | | 4 | | 6 | | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | 1 | | 3 | | 5 | | 7 | | | | |
| 3 | How many CARS does YOUR HOUSEHOLD HAVE AVAILABLE? → | NONE | | | ONE | | | TWO OR MORE | | | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 | Could YOU have made THIS JOURNEY by CAR TODAY? → | YES as driver | | | YES as passenger | | | NO | | | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 | Please indicate YOUR AGE GROUP and SEX → | AGE GROUP | 12-15 | 16-24 | 25-44 | 45-64 | 65 and over | SEX | Male | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | | Female | | | | | | | | | |
| 6 | Which one of THESE AREAS do YOU LIVE IN? → | HUDDERSFIELD | | DENBY DALE | | MELTHAM | | Rest of KIRKLEES | | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | KIRKBURTON | | HOLMFIRTH | | COLNE VALLEY | | OUTSIDE KIRKLEES | | | | |
| 7 | What TYPE of ACCOMMODATION do YOU LIVE IN? → | OWNER OCCUPIED | | RENTED FROM COUNCIL | | RENTED PRIVATELY | | TIED TO EMPLOYMENT | | OTHER | | |
| 8 | Please INDICATE YOUR ECONOMIC ACTIVITY → | WORKING FULL-TIME | | WORKING PART-TIME | | HOUSEWIFE | | UNEMPLOYED OR SEEKING WORK | | <input type="checkbox"/> | <input type="checkbox"/> | |
| | | STUDENT | | RETIRED | | OTHER | | | | | | |
| ALL INFORMATION WILL BE TREATED IN CONFIDENCE Thanks for your help! | | | | | | | | | | <input type="checkbox"/> | <input type="checkbox"/> | |

Variables Generated

Travel Characteristics

- Trip frequency
- Trip purpose
- Time of travel
- Ticket type used

Personal Characteristics

- Household car availability
- Journey car availability
- Age
- Sex
- Area of residence
- Tenure (accommodation type)
- Economic Activity

Figure 6: Construction of Contingency Table

| | | CHARACTERISTIC B | | |
|------------------|---------|------------------|--------|-------|
| | | Present | Absent | |
| CHARACTERISTIC A | Present | A | B | A + B |
| | Absent | C | D | C + D |
| | | A + C | B + D | N |

Figure 7: Illustrative Chi-Square (χ^2) Matrix

| <u>Characteristics</u> | 1 | 2 | 3 | 4 | 5 | 6 | Σ |
|------------------------|---------------|---------------|---------------|---------------|---------------|---------------|------------|
| 1 | — | χ^2_{12} | χ^2_{13} | χ^2_{14} | χ^2_{15} | χ^2_{16} | χ^2_1 |
| 2 | χ^2_{12} | — | χ^2_{23} | χ^2_{24} | χ^2_{25} | χ^2_{26} | χ^2_2 |
| 3 | χ^2_{31} | χ^2_{32} | — | χ^2_{34} | χ^2_{35} | χ^2_{36} | χ^2_3 |
| 4 | χ^2_{41} | χ^2_{42} | χ^2_{43} | — | χ^2_{45} | χ^2_{46} | χ^2_4 |
| 5 | χ^2_{51} | χ^2_{52} | χ^2_{53} | — | — | χ^2_{56} | χ^2_5 |
| 6 | χ^2_{61} | χ^2_{62} | χ^2_{63} | χ^2_{64} | χ^2_{65} | — | χ^2_6 |

defined in terms of the presence or absence of certain characteristics. Fuller descriptions of the technique may be found. (23)

Recoding to Binary Format

It will be evident that association analysis uses binary data (present/absent; male/female), but not all the data collected in this study were of that nature, for example, there were eight trip purposes. Such data can be recoded in two ways:

On the one hand, each category in a characteristic can be coded into a present/absent form: in such a method there would be eight different characteristics under the general heading of trip purpose. On the other hand the categories may themselves be grouped into two broad categories e.g. the eight trip purposes can be recoded in binary form as "essential" (trip to/from work, for education) and non-essential (shopping, recreation, etc). In this study, a mixture of the two strategies was adopted and characteristics have been grouped as shown in Figure 8. It must be recognised that such a recoding is to some extent arbitrary and may weight the analysis in that where two categories are exclusive and exhaustive of all the data (e.g. male/female), they are *a priori* more likely to yield high X^2 values and therefore to be important in the classification.

RESULTS OF THE ASSOCIATION ANALYSIS

Definition of Segments

The segmentation performed by association analysis is shown in Figure 9. The analysis yielded ten segments which in all but two cases (segments 3 and 10), individually represented more than 5% of the market. (It might be argued therefore that the final division between segments 2 and 3 and between 9 and 10, in both cases based on the sex of the traveller, should be disregarded, leaving eight segments). It is noticeable that the rest of the classification is completely symmetrical with the same criteria being used at each of the three stages in the division (trip purpose, economic activity and household car availability). The segments are defined therefore in these terms with the addition of the traveller's sex in the final division. Segment profiles are given in Figure 10.

Description of Segments

As well as their defining characteristics, each of the segments has additional characteristics which are shared by many (though not all) of their members. Those additional characteristics are summarised in Figure 10.

Segment 1

This segment constitutes 22% of the market surveyed and comprises economically inactive individuals from households with no car, making non-essential trips. Examination of Table 3 reveals that most of those trips (58%) are for shopping, and most of the trips (69%) are made less than four times per week, usually at off-peak times. The segment is dominated by persons aged 45 and above, mainly housewives and retired persons and its members usually pay cash for their tickets.

Segment 2

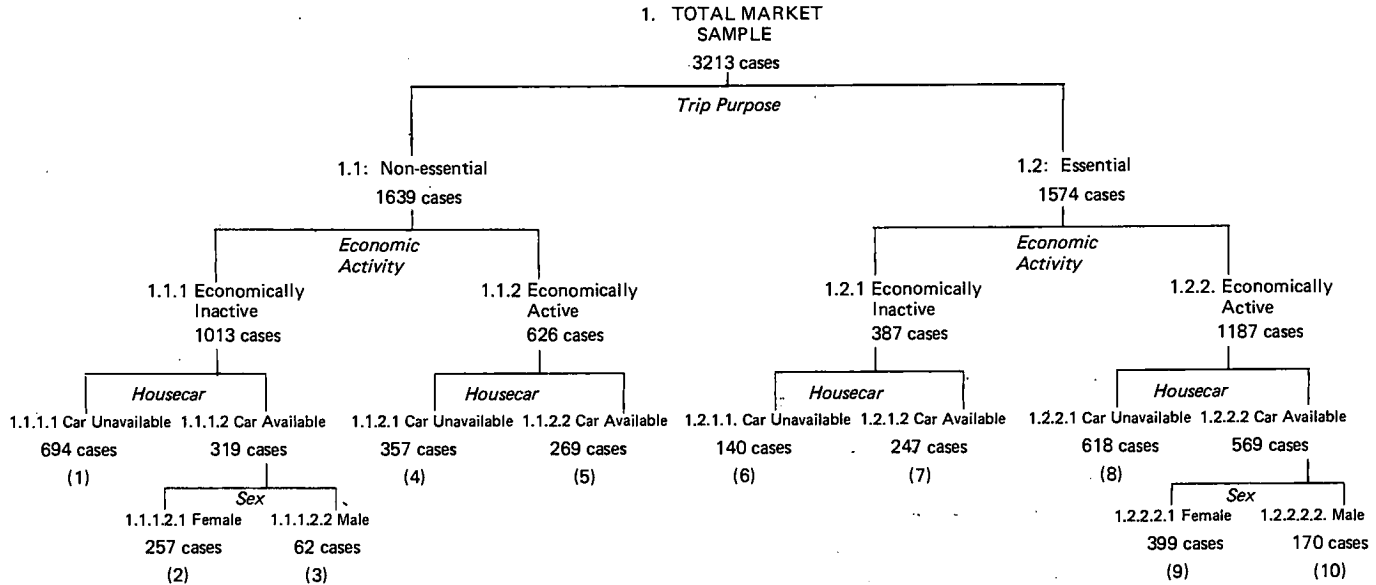
This segment forms about 8% of the surveyed market comprising economically active females from car-owning households, making trips for non-essential purposes. The dominant trip purpose is

Figure 8: Binary Data Recode Specification

| ORIGINAL SURVEY VARIABLE | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | '8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|--------------------------|-------------------------|---|---|---|---|---|---|---|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
| TRIP | To/from work | | | | | | | | | | | | | | | | | | | | | | |
| PURPOSE | In course of work | ■ | | | | | | | | | | | | | | | | | | | | | |
| | Education | | | | | | | | | | | | | | | | | | | | | | |
| | Personal business | | ■ | | | | | | | | | | | | | | | | | | | | |
| | Shopping | | | ■ | | | | | | | | | | | | | | | | | | | |
| | Entertainment/sport | | | | ■ | | | | | | | | | | | | | | | | | | |
| | Visit friends/relatives | | | | | ■ | | | | | | | | | | | | | | | | | |
| | Eat/drink | | | | | | ■ | | | | | | | | | | | | | | | | |
| TRIP | < 1 per week | | | | | | | | | | | | | | | | | | | | | | |
| FREQUENCY | 1 " | | | | | | | | | | | | | | | | | | | | | | |
| | 2 " | | | | | | | | | | | | | | | | | | | | | | |
| | 3 " | | | | | | | | | | | | | | | | | | | | | | |
| | 4 " | | | | | | | | | | | | | | | | | | | | | | |
| | 5 " | | | | | | | | | | | | | | | | | | | | | | |
| | 6 " | | | | | | | | | | | | | | | | | | | | | | |
| | 7 " | | | | | | | | | | | | | | | | | | | | | | |
| | 8+ " | | | | | | | | | | | | | | | | | | | | | | |
| HOUSEHOLD CAR | No cars | | | | | | | | | | | | | | | | | | | | | | |
| AVAILABILITY | One car | | | | | | | | | | | | | | | | | | | | | | |
| | Two or more cars | | | | | | | | | | | | | | | | | | | | | | |
| JOURNEY CAR | None available | | | | | | | | | | | | | | | | | | | | | | |
| AVAILABILITY | Available as driver | | | | | | | | | | | | | | | | | | | | | | |
| | Available as passenger | | | | | | | | | | | | | | | | | | | | | | |
| AGE GRDUP | 12-15 | | | | | | | | | | | | | | | | | | | | | | |
| | 16-24 | | | | | | | | | | | | | | | | | | | | | | |
| | 25-44 | | | | | | | | | | | | | | | | | | | | | | |
| | 45-64 | | | | | | | | | | | | | | | | | | | | | | |
| | 65+ | | | | | | | | | | | | | | | | | | | | | | |
| SEX | Male | | | | | | | | | | | | | | | | | | | | | | |
| | Female | | | | | | | | | | | | | | | | | | | | | | |
| AREA OF | Huddersfield | | | | | | | | | | | | | | | | | | | | | | |
| RESIDENCE | Danby Dale | | | | | | | | | | | | | | | | | | | | | | |
| | Meltham | | | | | | | | | | | | | | | | | | | | | | |
| | Kirkburton | | | | | | | | | | | | | | | | | | | | | | |
| | Holmfirth | | | | | | | | | | | | | | | | | | | | | | |
| | Colne Valley | | | | | | | | | | | | | | | | | | | | | | |
| | Rest of Kirklees | | | | | | | | | | | | | | | | | | | | | | |
| Outside Kirklees | | | | | | | | | | | | | | | | | | | | | | | |
| ACCOMMODATION | Owner Occupied | | | | | | | | | | | | | | | | | | | | | | |
| TENURE | Council Rented | | | | | | | | | | | | | | | | | | | | | | |
| | Private Rented | | | | | | | | | | | | | | | | | | | | | | |
| | Tied to Job | | | | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | | | | |
| ECONOMIC | Fulltime | | | | | | | | | | | | | | | | | | | | | | |
| ACTIVITY | Part-time | | | | | | | | | | | | | | | | | | | | | | |
| | Housewife | | | | | | | | | | | | | | | | | | | | | | |
| | Unemployed | | | | | | | | | | | | | | | | | | | | | | |
| | Student | | | | | | | | | | | | | | | | | | | | | | |
| | Retired | | | | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | | | | |
| TICKET TYPE | On bus cash | | | | | | | | | | | | | | | | | | | | | | |
| | Weekly Metrocard | | | | | | | | | | | | | | | | | | | | | | |
| | Monthly Metrocard | | | | | | | | | | | | | | | | | | | | | | |
| | Annual Metrocard | | | | | | | | | | | | | | | | | | | | | | |
| | Saverstrip | | | | | | | | | | | | | | | | | | | | | | |
| | Dayrover | | | | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | | | | |
| TIME OF | Peak | | | | | | | | | | | | | | | | | | | | | | |
| TRAVEL | Off-peak | | | | | | | | | | | | | | | | | | | | | | |

Note: Certain variables were recoded to provide several 'new' binary variables. The 'presence' component of each 'new' binary variable in terms of its original variable values is shown in the shaded areas. The 'absence' component of each 'new' binary variable is represented by the non-shaded area; e.g. for 'new' variable no. 1 to/from work, in course of work and education are recoded to the 'presence' component, whilst the five remaining values of the original purpose variable are recoded as the 'absence' component of the 'new' binary variable.

Figure 9 : Association Analysis Dendrogram



N.B. Critical variables, on which the division was made, are shown in italics

Figure 10: Segment Profiles: Summary of Main Characteristics

| | | | |
|---|-------------------------|---|---------------------|
| Segment 1 (21.6% of market sample) | | Segment 6 (4.4% of market sample) | |
| *Non-essential (57.8 shopping) | 95.8 No Jourcar | *Essential (75.0 Education) | 95.7 No Jourcar |
| *No Housecar (100) | 62.7 Huddersfield | *No Housecar (100) | 65.0 Huddersfield |
| *Economically-inactive (55.9 Retired) | 49.3 Owner-occupier | *Economically-inactive (77.9 Student) | 39.3 Owner-occupier |
| 21.9 2 per week | 41.6 Council rented | 48.6 5 per week | 59.3 16-24 |
| 20.0 1 per week | 50.0 65+ | 75.1 Cash | 55.7 Female |
| 86.5 Cash | 74.9 Female | 64.3 Peak | |
| 78.1 Off Peak | | | |
| Segment 2 (8.0% of market sample) | | Segment 7 (7.7% of market sample) | |
| *Non-essential (55.6 shopping) | 77.0 Off Peak | *Essential (85.0 Education) | 76.5 No Jourcar |
| *Yes Housecar (100) | 79.8 No Jourcar | *Yes Housecar (100) | 39.7 Huddersfield |
| *Female (100) | 49.0 Huddersfield | *Economically inactive (89.9 Student) | 34.8 Coine Valley |
| *Economically-inactive (67.7 Housewife) | 78.6 Owner-occupier | 56.7 5 per week | 75.7 Owner-occupier |
| 27.6 2 per week | 33.9 45-64 | 64.8 Cash | 71.7 16-24 |
| 90.7 Cash | 31.5 25-44 | 78.5 Peak | 55.5 Female |
| Segment 3 (1.9% of market sample) | | Segment 8 (19.2% of market sample) | |
| *Non-essential (43.5 Ents/Sport) | 82.3 Cash | *Essential (86.2 to/from Work) | 90.5 No Jourcar |
| *No Housecar (100) | 77.4 Off Peak | *No Housecar (100) | 63.1 Huddersfield |
| *Male (100) | 62.0 No Jourcar | *Economically active (76.2 F.T. employed) | 51.3 Owner-occupier |
| *Economically-inactive (58.7 Student) | 41.9 Huddersfield | 39.6 5 per week | 38.2 25-44 |
| 25.8 1 per week | 62.9 Owner-occupier | 73.3 On-bus cash | 33.3 16-24 |
| 21.6 2 per week | 38.7 16-24 | 60.8 Peak | 56.6 Female |
| Segment 4 (11.1% of market sample) | | Segment 9 (12.4% of market sample) | |
| *Non-essential (34.7 Shopping) | 91.3 No Jourcar | *Essential (87.5 to/from Work) | 67.9 Peak |
| *No Housecar (100) | 83.9 Huddersfield | *Yes Housecar (100) | 84.0 No Jourcar |
| *Economically-active (38.4 F.T. employed) | 44.9 Council | *Economically active (65.7 F.T. employed) | 54.9 Huddersfield |
| 16.2 1 per week | 40.9 Owner-occupier | *All Female (100) | 79.2 Owner-occupier |
| 15.4 2 per week | 34.2 Unemployed | 50.1 5 per week | 42.1 16-24 |
| 88.2 Cash | 39.8 25-44 | 69.9 Cash | 35.6 25-44 |
| 77.0 Off Peak | 56.9 Female | 23.8 Saverstrip | |
| Segment 5 (8.4% of market sample) | | Segment 10 (5.3% of market sample) | |
| *Non-essential (31.6 Personal business) | 62.1 Huddersfield | *Essential (73.5 to/from Work) | 67.1 Peak |
| (30.1 shopping) | 71.4 Owner-occupier | *Yes Housecar (100) | 63.5 No Jourcar |
| *Yes Housecar (100) | 45.7 Full-time employed | *All Male (100) | 57.6 Huddersfield |
| 21.2 2 per week | 45.7 16-24 | *Economically active (88.8 F.T. employed) | 73.5 Owner-occupier |
| 18.6 < 1 per week | 68.8 Female | 35.9 5 per week | 56.5 16-24 |
| 87.7 Cash | 75.8 Off Peak | 80.0 Cash | |
| 70.3 No Jourcar | | | |

* - denotes value is a component of a critical variable on which the association analysis split was made.

(N.B. Figures shown refer to percentages within each segment)

shopping at off-peak periods and although the household is car-owning, in most cases (80%) no car was available for the trip made. Most trips (74%) are made less than four times per week. Travellers are mainly in the middle age range, predominantly housewives.

Segment 3

This small segment (2%) only differs in definition from Segment 2 in being male, but it also shows marked differences in that the main purpose is entertainment and sport, and most of the travellers (85%) are under 24 years of age, mainly students (58%). It is this descriptive difference which suggests that Segment 3 should be kept distinct from Segment 2. (It is also distinct from two other segments, 6 and 7, with the same occupation and age profile.)

Segment 4

This segment (11% of the surveyed market) is defined as non-essential trips from non car-owning households by economically active persons. There is a fairly broad spread of trip purposes, 55% of the trips were made less than four times per week, mainly in the off-peak (77%). Cash was the main method of ticket payment.

Segment 5

This segment represents non-essential trips by economically active persons from car-owning households. Most of the trips are for shopping (30%) or personal business (32%), and trips are mostly (63%) made less than four times per week at off-peak periods (76%); 80% of the trip makers are aged 16-44, over two-thirds of them being female. Most (88%) paid cash for their trip ticket.

Segments 6 and 7

These segments represent essential trips made by economically inactive individuals from households with (Segment 6, 4%) and without cars (Segment 7, 8%). In all other respects the two segments are similar, being mainly regular education-based trips (75% and 85% respectively) made by people under 24. They are also characterised by an unusually high level of Saverstrip* use (15% in both cases). Although they have been placed under one heading in this description they have markedly differing degrees of dependence on the bus (in general, and for the trips in question).

Segment 8

This is a large and important segment with 19% of the surveyed market, being defined as essential trips made by economically active persons from non car-owning households. Trips are made at peak times, 5 or more times per week (80%). Trip makers are in the middle age range; ticket payment is by cash.

Segments 9 and 10

These segments have identical definitions except that they distinguish females from males: essential trips by economically active persons from car-owning households. Segment 9 (12% of the market) is comprised entirely of females making, for the

* (Saverstrip is a WYPTE multi-journey discount prepayment ticket. At the time of the survey it enabled 12 trips to be purchased for the price of ten.)

most part, very regular peak period trips to or from work and spanning the age range 16-64; they are distinguished by a very high relative level of Saverstrip use (24%). Segment 10 (5% of the surveyed market) comprises males mostly in the younger adult groups making peak hour trips but compared to the female group the trips are less regular and tickets are more frequently paid for by cash. Once again therefore (as in Segments 3 and 4) the division into male and female segments identified other contrasts in bus use.

CONCLUSIONS

Two main conclusions can be drawn from this study. Firstly, on a methodological level, association analysis can be used effectively in those analytical situations where the data is of a variable quality in measurement terms. Since the technique operates using binary division, nominal data can be included in the clustering procedure without any loss of credibility in the results obtained. In a transport context, as in many areas of marketing, this means that information that would otherwise be lost can be incorporated within a fuller multivariate analysis. A similar study of the public transport market was carried out in the Leeds Metropolitan District of West Yorkshire in February 1985 using the same methodology. The association analysis yielded almost identical market segments thus demonstrating the robustness of the technique. It must be recognised however that the very nature of an association analysis makes it susceptible to a certain amount of subjectivity in requiring judgments to be made by the researchers at different stages of the analysis. In this respect the technique is a little different from many others but advance recognition of this requirement should ensure its judicious use. At a marketing level, Kotler has identified three main characteristics of a meaningful segmentation - measurability, accessibility and substantiality. (24) Figure 10 can be used to evaluate the potential of each segment in those terms. It can be seen that while some of the segments perform well in all aspects, others are less accessible, measurable and/or substantial. The ultimate choice of segment to promote, and also of targeting method, must ultimately rest with the operator and is a policy decision. The methodology outlined in this paper has provided a useful contribution to this decision-making process. (25)

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