

International cross validation of shopping center consideration set segmentation

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INTERNATIONAL CROSS VALIDATION OF SHOPPING CENTER CONSIDERATION SET SEGMENTATION

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Introduction

Managers of shopping centers and their retail tenants both need to know how choice of their centers will vary with changes in consumers' perceptions of their own and their competitors' centers, and ultimately with the underlying realities that are controlled by their management actions. Thus it is important for shopping center managers to be able to efficiently determine the perceptions of their centers and how those perceptions influence the choice behavior of each of the consumer segments they are attempting to attract. Thus, as a necessary first step, managers require models relating shopping center patronage to consumers' subjective center perceptions for all important market segments.

When addressing these issues, Finn and Louviere (1990) (hereafter F&L) obtained encouraging results by using consumers' consideration sets as a basis for developing segments, and then modeling aggregate and segment choice of shopping center as a function of distance and perceptual variables using a form of spatial interaction model. The context for their results was an Edmonton, Canada study of residents' choice of a shopping center when shopping for clothes. The segments they obtained were demographically distinct. More importantly, they exhibited managerially relevant and substantial differences in their responses to their center perceptions. The study also found the consideration set data provided interesting insights into the structure of competition between centers. The concept of consideration sets as used in the marketing literature is closely related to concepts such as information fields used in geography (Hanson, 1976; Potter, 1976a, 1977a, 1977b, 1977c, 1978, 1979; Timmermans, van der Heijden, and Westerveld, 1982). These concepts are used to define the set of shopping centers consumers are

familiar with. The literature suggests that consumers often take into consideration those centers they are familiar with. Consistent with the marketing literature, the identification of information fields constitutes a first step in the model building approach in an attempt to develop segments and then modeling consumer choices (van der Heijden and Timmermans, 1984).

The purpose of this study is to: 1) determine whether consideration set segmentation of shoppers would prove as useful in quite different international shopping environments; and, 2) investigate whether similar types of consideration set segments would be found across cultures and urban environments.

To achieve these objectives, we first briefly describe the F&L approach to consideration set based segmentation for shopping center choice modeling. We then describe the collection of similar consideration set and attribute association data in Oslo and Eindhoven, and the substantive consideration and perception results for shopping centers in the cities. We next report the segmentation and choice modeling results for each city, and then compare the Oslo and Eindhoven results with Edmonton. We conclude with the implications we would draw for the generalizability of consideration segmentation for choice modeling.

Conceptual Background

Consideration Set Segmentation

Whereas most previous attempts to segment shoppers a posteriori have applied some type of clustering to measures of individual differences in sociodemographic, psychographic, or store image data, F&L used consumers' consideration sets as the basis for segmentation. They argued: 1) such sets play an important intermediate role in choice; 2) knowledge and existence of such sets is a critical assumption in statistical choice models; 3) measures of such sets provide significant information about the way consumers include and eliminate alternatives; and 4) the sets are easily collected.

They treated joint occurrence of shopping centers within consideration sets as an indicator of similarity or substitutability among centers for segmentation purposes. This idea was

operationalized by correlating centers with one another based on the patterns of their 1's (in the set) and 0's (not in the set), assuming the Pearson Product Moment Correlation was a reasonable first approximation to measure similarities from such binary data. They then applied complete linkage hierarchical clustering (Punj and Stewart, 1983) to these measures of similarity to identify centers with similar patterns of consideration. Finally, they used the information contained in the hierarchical clustering of centers as input when clustering individuals with similar consideration sets using K-means clustering. This allowed them to use the results of the hierarchical clustering to select algorithm seed points to improve the performance of the K-means procedure. Using a mail survey and data from 339 Edmonton area respondents, they found five segments, three with a similar average consideration set size of about four but with geographically distinct content, and two with distinctively larger and smaller set sizes.

Multinomial Logit Discriminant Analysis (MNLA) (Bishop, Feinberg and Holland, 1975) showed there were significant differences between the segments on actionable demographic measures like age, income, education, sex, etc. Finally, they compared the parameters of a MNL choice model estimated for all shoppers with the parameters of MNL choice models estimated for each of the five segments. The segments exhibited important differences in their response to center perceptions. For example, members of the segment of consumers with large consideration sets, who were disproportionately, male, married, over 65, very highly educated, and high income, were most responsive to perceptions of good service and latest fashions. And, unlike most other segments, their most recent purchase was not responsive to the perceived width of selection available at a center.

Validity as Robustness

F&L generated a set of encouraging empirical findings by applying this new method to the substantive domain of interest. However, only when the results of a single study have been compared with other studies that examine the same problem do we truly increase knowledge (Brinberg and McGrath, 1985). Thus to fully establish the validity of

consideration set segmentation would require an investigation of its robustness on such facets as retailing environment (e.g., Edmonton compared with other cities), choice objects (e.g., apparel compared with groceries), data collection procedure (e.g., mail survey compared with phone interviews), time (e.g., 1988 compared with 1991), etc.. The purpose of conducting a set of studies which vary on one of these facets is to determine under what conditions the findings triangulate, and under what conditions the findings no longer hold.

The facet of greatest concern of the validity of consideration set segmentation would appear to be retailing environment, as Edmonton has a number of characteristics which could make results obtained there atypical. First, it has an extremely high proportion of its retail space in planned shopping centers (malls), due to the rapid suburban growth of the 1970s and the subsequent relocation of most city center retailing into planned infill centers in the 1980s. As a result relevant shopping center alternative are readily identified. Secondly, Edmonton is a city with a quite regular grid pattern of streets, with only the river valley, which cuts through an otherwise flat shield, providing a minimal topological barrier. As a result, for its size, it is very easy to drive around by private vehicle, as it is essentially free of traffic jams. Thirdly, Edmonton is an isolated metropolitan area, so the set of relevant retail alternatives is quite easily identified. Finally Edmonton is the location of an important retailing innovation, namely the first mega-multi-mall at West Edmonton (Finn and Rigby, 1992). Therefore, to initiate an investigation of the robustness of consideration set segmentation on the facet of international retail environment, a set of cities was chosen for similar studies. The environments chosen for this test were Oslo, Norway and Eindhoven, The Netherlands. European cities were examined because they have generally been viewed as a more difficult environment than North American cities for the application of spatial interaction models, due to the lower levels of car ownership and the greater use of public transport for shopping trips in Europe (Rogers, 1984).

Other Shopping Environments

The Oslo retail environment differs from Edmonton in several ways. First, shopping opportunities are predominantly in traditional town and city center shopping districts. These districts have evolved slowly over many decades, during which some of the towns have merged into suburbs of the city. Planned shopping centers are a relatively recent phenomenon in Norway, and they still make up only a small proportion of total retail space. Moreover, by North American standards, even the larger of these planned centers are quite small, and they have supermarkets, not major or discount department stores, as their anchors. Secondly, because it is hemmed between mountains and fjords, Oslo has a very hilly terrain, a very elongated shape, and a quite irregular street pattern. Thirdly, Oslo is not an isolated city, rather its trade area includes historically self contained cities of Drammen, Sandvika, and Lillestrom.

Eindhoven, in the southeast corner of the Netherlands, is a much smaller and far newer European city, which has grown from a small town to a major industrial city, round the world headquarters and manufacturing plants of Phillips. Its retail environment is similar to Oslo's retail environment. The city center is still the most important shopping center. There is one regional center. Most neighborhoods have a planned center with supermarkets as anchors. Finally, there are several unplanned shopping streets.

Table 1 summarizes these and some other differences between the Oslo, Eindhoven and Edmonton shopping environments.

Empirical Studies

Given our focus on the retailing environment facet, the empirical research reported here also deals with choice of a shopping center when shopping for apparel. As in Edmonton, each study collected data for residents' shopping center consideration sets, most recent choices, past spending patterns, and perceptions of center attributes, as well as normal sociodemographic information.

Table 1
Oslo, Eindhoven, and Edmonton Retail Environments

Aspects of Urban and Shopping Environment	Oslo	Eindhoven	Edmonton
Trade area Population	699,000	900,000	750,000
Urban topography	Hills with very few flat spots	Very flat	Very flat, but deep river valley
Street pattern	Very irregular street network	Well planned neighborhoods	Regular street grid
First planned shopping center	Early 1980s	Early 1970s	1967
Planned centers in area studied	6 of 13	13 of 18	17 of 18
Planned center size (1000's Sq.Ft. GLA)	100 - 300	180 - 300	150 - 3,500
Typical center anchor store	Supermarket	Supermarket	Full or discount dept. store
Normal weekly shopping hours for apparel stores	48 hours on six days	48 hours on six days	70 hours on seven days
Predominant apparel store organization	Independents. A few chains	Independents Some chains	Chains. Some independents

Consideration sets were obtained by asking respondents to indicate which of the centers they would "seriously consider" when choosing a place to shop for clothing for themselves or members of their household. Respondents also reported the approximate percentage of their clothing purchases in the previous two year that were made in each of the shopping centers; the center at which they most recently shopped for clothes; and the center at which they were most likely to next shop for clothes. Center perceptions were measured by asking respondents to associate (yes, no) any of eight attributes they felt applied to each center. 'Convenient parking' and 'easy to get around' were added to the attributes used in the Edmonton study, because it appeared their greater variability for European shopping centers might make them influential in choice.

Oslo

To fully investigate the isolated market issue, in Oslo we chose to only study residents living in the center and west of the city, taking the fjord and the Akerselva river as the boundary.

This study includes all significant town and central city shopping districts and all of the planned centers including multiple apparel retailers located in the center and western areas of the city and its western suburbs. The 13 specific centers included were: the city center district round Karl Johan-Oslo sentrum; Bogstradveien, the traditional apparel retailing street; three new planned centers in the downtown area, namely Aker Brygge, Galleri Oslo and Oslo City; the western city or suburban centers of Asker, Bekkestua, Drammen, Sandvika and Osterås; and the suburban planned centers of CC Vest, Liertoppen, and Storo Shopping. These centers were identified through discussions with local retailing experts and managers of the planned centers about their competitors.

For cost reasons, the Oslo data were obtained from a drop off and mail return survey conducted in March 1990. Twenty street corners were randomly selected as starting points, and a short cover letter, questionnaire, and a reply envelope were dropped at the first 50 successive residences from each corner. After 7 days, a second copy of the

questionnaire was dropped at the same residences. This sample of 1,000 households produced an overall response rate of just over 30 percent. After eliminating a few respondents with substantially incomplete data, useful data were available for 301 individuals. As the response rates varied considerably by sampling location, individual responses were reweighted to compensate whenever projections were made to the area population.

Due to an oversight on translation, the "all other" category to accommodate respondents who would consider shopping elsewhere within the city was omitted. Nevertheless, some respondents wrote in additional smaller shopping centers, such as Rykkinn, Slemdal and Stabekk. These were included in the analysis as instances of consideration of an "Other" center. The latter two questions employed an open ended format, and again other centers within the area were sometimes identified.

Respondents identified the closest sampling corner to their home, and these street corners were used to approximate the straight line distance from each respondents' residence to each shopping center. The irregular street pattern made it impossible to measure city block distances directly off a map, so the straight line distances were simply multiplied by a factor of 1.41, to facilitate more direct comparison of distance parameter estimates for Oslo and Edmonton.

Eindhoven

The Eindhoven study included all levels of the hierarchy of shopping centers down to community centers. The specific centers included were: Eindhoven city, center 'Woensel' planned shopping center; out of town center 'de Hurk', six shopping streets, namely Kastelenplein, F. Leharplain, Wijngaardplein, Haagdijk, Orionstraat, and Boulevard-Zuid, plus fourteen community centers, and an all other centers category.

The questionnaire was mailed to a random sample of 1,000 households in March 1991. A reminder postcard and a second mailing of the survey produced an overall response rate of just about 35 percent, useful data were available for 345 individuals. As respondents'

home addresses were known, these were used to compute distances from each respondents' residence to each of the shopping centers.

Results

In this section we first report some aggregate level findings as to the size and composition of consumers' consideration sets, and perceptions of the shopping centers. We compare these consideration and perception data with those for Edmonton. Then we describe and discuss the segmentation results, beginning with our approach to center clustering and segmentation.

Table 2 lists both the thirteen Oslo, eighteen Eindhoven, and seventeen Edmonton centers (Finn and Woolley-Fisher, 1988) in order of the percentage of consumers who reported they would seriously consider them. It also reports their share of most recent purchases to provide information on the distribution of center importance. In Oslo, Karl Johan-Oslo sentrum attracted the most consideration, followed by Bogstadveien and Sandvika sentrum, while Storo Shopping and Galleri Oslo attracted the least consideration. In Eindhoven, the city center attracted almost universal consideration, followed by Woensel and Orionstraat. While the consideration level distributions were fairly similar, the Oslo and Eindhoven centers exhibited a more skewed distribution of market shares.

Table 3 reports the frequency distribution of consideration set sizes obtained for in Oslo and Eindhoven, and compares them with the distribution obtained in Edmonton. Both Oslo and Eindhoven residents reported considering far fewer shopping centers, with a mean set sizes of 2.36 and 2.63 compared with 3.81 for Edmonton. A number of factors could be contributing to this difference, including differences in the nature of shopping opportunities, such as those identified in Table 1, and differences between European and Edmonton consumers. Examples of the latter might be differences in involvement in shopping as an activity or in clothes as a product class.

Consideration Set Data

Table 2

Comparative Performance of Oslo, Eindhoven and Edmonton Centers

Oslo Centers	I	II	Eindhoven Centers	I	II	Edmonton Centers	I	II
	%	%		%	%		%	%
K.J. Oslo	55	31	City cent.	89	58	Southgate	46	12
Bogstad	42	18	Woensel	66	30	Kingsw.G.	44	12
Sandvika	33	10	Kruisstraat	30	1	Heritage	39	11
Oslo City	20	7	De Hurk	10	1	West Edm.	37	17
Asker s.	19	9	Boulevard-Zd	9	1	Edm.Cent.	37	7
AkerBrygge	18	4	Wijngaardpln	8	0	Westmount	31	6
Liertoppen	12	4	Aalsterweg	7	1	Londond.	21	5
Bekkestua	11	4	Haagdijk	6	1	Bonnie D.	21	6
CC Vest	8	4	Belgie Plein	6	1	Eaton C.	19	2
Drammen	5	1	Roostenlaan	4	0	Northwood	18	5
Osterås	4	1	St. Trudopl n	4	1	Capilano	12	3
Storo	3	1	Kastelenpln	3	0	North Twn	11	2
Galleri	2	0	F. Leharpln	2	0	Manulife	9	2
Other	5	5	Orionstraat	2	0	Meadowlark	9	1
			P.van Arspln	2	0	Millbourne	8	2
			Nederlandpln	1	0	Centennial	4	0
			Bairritz Pln	1	0	Abbotsfld	2	1
			P.Canisiusln	1	0	Other	5	7
			Other	10	1			

Valid Responses 302 281 345 334 339 339

a Centers are listed in order of consideration level.

I Currently Consider

II Most Recent

Table 3
Oslo, Eindhoven, and Edmonton Consideration Set Sizes

Consideration Set Size	<u>Oslo</u>		<u>Eindhoven</u>		<u>Edmonton</u>		
	No.	% Weighted	No.	%	No.	%	
Size zero	2	0.7	0.5	4	1.2	1	0.3
Size one	89	29.6	30.7	70	20.3	38	9.7
Size two	76	25.2	24.7	111	32.2	60	15.3
Size three	80	26.6	27.2	84	24.3	91	23.2
Size four	38	12.6	11.7	42	12.2	78	19.8
Size five	11	3.7	3.7	18	5.2	53	13.5
Size six	5	1.7	1.4	9	2.6	36	9.2
Size seven				5	1.4	26	6.6
Size eight				1	0.3	4	1.0
Size nine				1	0.3	3	0.8
Size ten						1	0.3
Size eleven						1	0.3
Size twelve						1	0.3
Total	301	100.0	100.0	345	100	393	100.0
Mean		2.38	2.36		2.63		3.81
Mode		1	1		2		3
Median		2	2		2		4

Center Perceptions

The top section of Table 4 reports the percentage level of association for each of the specific Oslo and Eindhoven centers with each of the eight attributes.

The strongest Oslo association was between Karl Johan-Oslo sentrum and wide selection, which was made by just over half of all residents. In contrast, nobody associated Storo Shopping with high quality or with good service. Comparisons within a row in this section of the Table show that of the eight possible associations, Åsker, CC Vest, Liertoppen, Sandvika, Storo and Osterås all were most strongly associated with convenient parking, Aker Brygge and Galleri Oslo were most strongly associated with high prices, Bogstadveien, Drammen, Karl Johan-Oslo sentrum, and Olso City were most strongly associated with wide selection, while Bekkestua was most strongly associated with ease to get around. Between center comparisons of these association percentages compound the effects of differences in awareness of the centers and their positioning in the minds of those who are aware. Relative levels of awareness are approximately indicated by the average total number of associations made for a center, which are shown in the final column of the Table 4. Karl Johan-Oslo sentrum with an average of 1.75 associations per consumer had the highest level of awareness, and was followed by Bogstadveien, Sandvika and Oslo City. The lowest level of awareness was 0.12 for Osterås, representing less than one association amongst eight consumers.

The strongest Eindhoven association was of the city center with wide selection, reflecting a general similarity of pattern of associations with Oslo. Indeed, the distribution of awareness levels was even more skewed than for Oslo, with the city center and Woensel receiving more associations between them than all other centers combined.

The lower half of Table 4 reports similar information for Edmonton, with general comparable results. The only exception would appear to be the 2.43 associations per consumer for West Edmonton Mall, which can be accounted for as a special case (Finn and Rigby, 1992).

Table 4
Center Associations for Oslo, Eindhoven and Edmonton
Shopping Centers

	I	II	III	IV	V	VI	VII	VIII	IX
<u>Percent of All Consumers Making an Association for a Center</u>									
Oslo Centers									
K. J. Oslo	3	21	27	51	16	16	15	27	1.75
Bogstadveien	6	23	26	30	21	7	14	19	1.32
Sandvika s.	26	24	12	14	15	7	6	5	1.08
Aker Brygge	17	7	13	14	3	4	25	18	1.01
Oslo City	8	9	5	23	3	8	6	13	0.74
Asker sentrm	20	18	8	5	7	5	4	4	0.71
Liertoppen	19	10	2	6	3	13	2	4	0.60
Bekkestua s.	10	10	5	2	6	3	2	2	0.40
CC Vest	12	9	2	4	2	8	1	2	0.40
Drammen	4	2	3	5	2	4	1	2	0.22
Storo	9	4	0	3	0	5	1	0	0.21
Galleri Oslo	3	2	1	2	0	1	3	2	0.13
Osterås s.	7	4	1	1	1	0	2	1	0.12
Eindhoven Centers									
City cent.	10	58	34	82	22	17	14	53	2.90
W.C. Woensel	69	62	22	39	24	13	7	26	2.63
Kruisstraat	10	18	10	17	14	19	4	10	1.02
De Hurk	10	7	1	2	1	13	0	1	0.34
Boulevard-Zd	4	7	3	3	6	1	2	3	0.28
Wijngaardpln	5	6	1	2	4	2	1	1	0.23
Aalsterweg	1	3	5	3	6	2	2	1	0.23
Kastelenplein	9	8	1	1	2	0	1	1	0.22
Haagdijk	5	3	3	1	4	1	3	2	0.21
Belgie Plein	7	5	1	1	1	5	0	0	0.21
St. Trudopl n	4	4	1	1	3	0	1	0	0.15
Roostenlaan	2	2	1	1	2	2	1	0	0.11
Orionstraat	3	3	0	0	2	0	1	1	0.10
F. Leharpl n	2	2	0	1	1	1	0	0	0.08
Nederlandpl n	3	1	1	0	1	1	0	0	0.08
P. van Arspl n	1	1	1	1	2	1	0	1	0.07
Bairritzpl n	1	1	1	0	1	0	1	0	0.06
P. Canisiusl n	0	1	0	0	0	0	0	0	0.02

I Conv. Park. IV Wide Select VII High Price
 II Easy Round V Good Service VIII Latest Fash.
 III High Quality VI Low Price

IX Number of Associations Made per Consumer

Shopping Center Clusters Based on Consideration Sets

The correlation's used to measure the similarity of pairs of Oslo shopping centers ranged from .56 (Asker with Liertoppen) to -.29 (Bogstadveien with Liertoppen), compared with the .58 to -.33 reported for Edmonton. The results of a complete linkage hierarchical cluster analysis of the shopping center correlation matrix are shown in the dendrogram in Figure 1. Figure 2 displays the same clustering results on a map of the western section of the Oslo region, which shows the locations of the thirteen shopping centers and some other geographic points mentioned in this paper. As can be seen, the shopping centers cluster primarily on geography, with the Oslo city boundary with the suburban district of Boerum serving as the primary break in the hierarchy. Thereafter, geography continues to dominate the hierarchy, followed by some lesser effects of type of center, such as closer competition between Oslo City and Aker Brygge, both of which are new planned centers.

This distinctness of the clusters can be seen in Table 5, which profiles each cluster according to the proportion of individuals who "consider" a particular shopping center. We label the four clusters as Central, Western, Small Set and Large Set consideration segments.

Discussion

Our research confirmed both that Oslo and Eindhoven shopping centers could be meaningfully grouped into a consideration hierarchy based on knowledge of shopper consideration sets in a similar fashion to Edmonton centers despite the many differences in the retailing environments of the two cities. And, this hierarchy appears to provide useful insight into the structure of competition between centers for the apparel market. The report also demonstrates that managerially useful data on positioning of centers within segments can be collected economically, using the attribute association data collection approach employed for this study. Our research however also showed differences between the European cities and the Canadian city in terms of size of consideration sets. The results suggests that shopping patterns in the European cities are more focused in a more

Shopper Segments Based on Consideration Sets

Table 5

Consideration of Oslo & Eindhoven Shopping Centers by Segments

	I	II	<u>set size</u>			V	<u>set size</u>	
			III	IV			III	IV
K. J. Oslo	96*	16	41	76*	City cent.	84*	93*	91*
Bogstadveien	80*	1	35	56*	Woensel	100*	0	99*
Sandvika s.	0	70*	0	100*	Kruisstraat	0	17	100*
Oslo City	47*	7	11	13	Koopcentrum	10	7	15
Asker sentrum	5	64*	1	6	Boulevard-Zd	6	15	7
Aker Brygge	39	14	0	23	Wijngaardpln	8	0	17
Liertoppen	0	41	4	0	Haagdijk	8	3	7
Bekkestua s.	5	12	4	34	Aalsterweg	6	11	5
CC Vest	10	3	9	12	Belgie Pln	7	3	11
Drammen	2	13	1	2	Roostenlaan	2	7	5
Osterås	2	2	5	8	St. Trudopl n	3	3	7
Storo	5	2	4	2	Kastelenpln	3	3	5
Galleri Oslo	2	0	3	0	F. Leharpln	3	2	2
Other centers	3	4	6	7	Orionstraat	1	0	6
					P.van Arspln	1	2	3
					Nederlandpln	1	0	4
					Bairritzpln	1	0	2
					P.Canisiusln	1	2	1
Raw Size	72	90	85	54		144	116	85
Weighted Size	84	78	96	45				

I Central IV Large
 II Western V Average
 III Small

restructured set of shopping centers. It would therefore be of interest to investigate whether models of consumer shopping choice behavior are transferable across these cities. The authors hope to report on this issue in the near future.

Figure 1
 Dendrogram for Complete Linkage Hierarchical
 Clustering of Oslo Shopping Centers

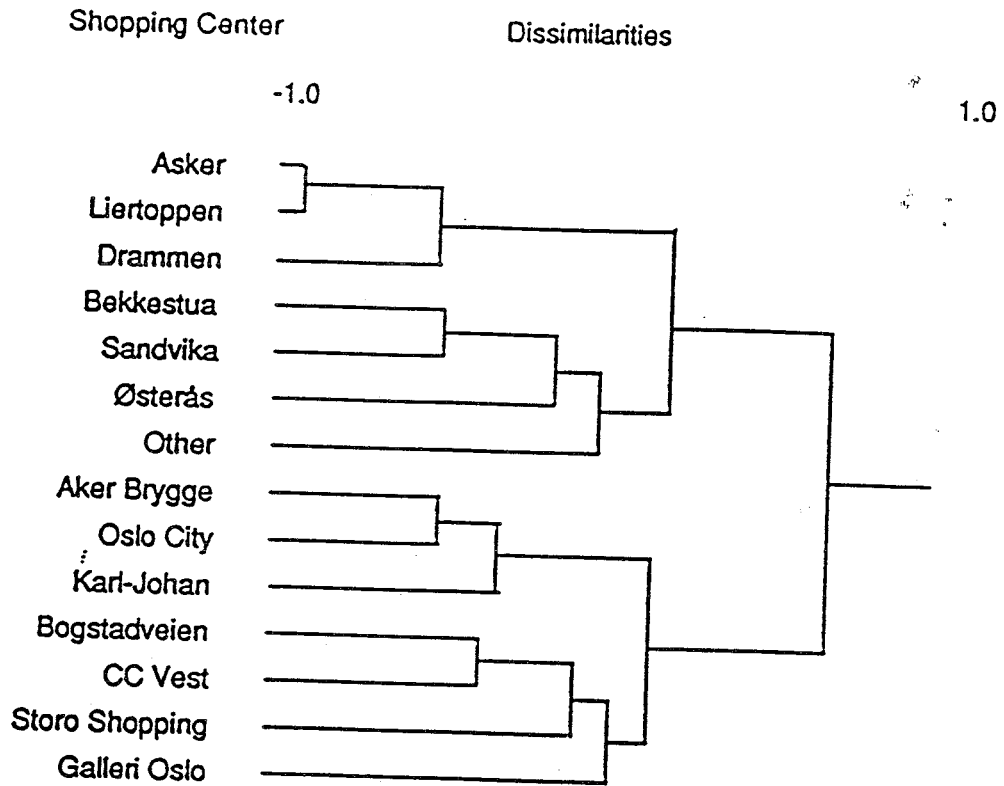


Figure 2
Complete Linkage Hierarchical Clustering of Oslo Shopping Centers

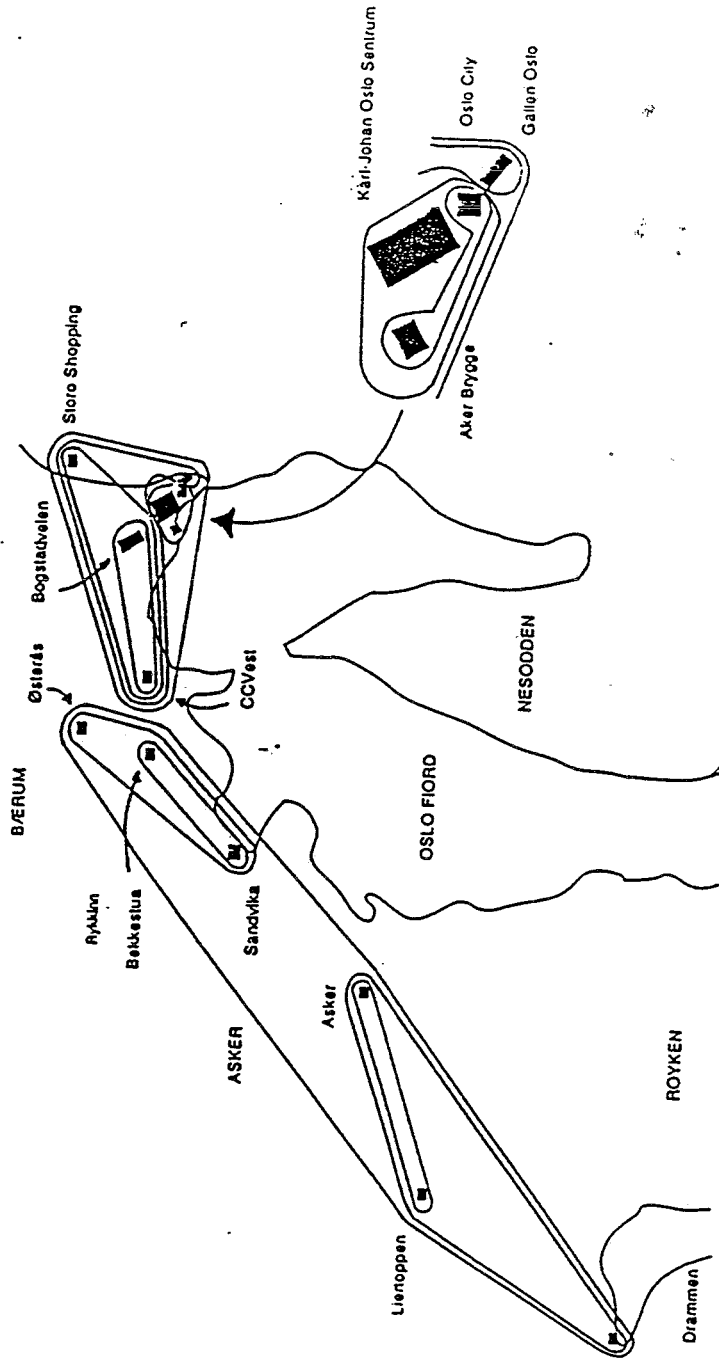
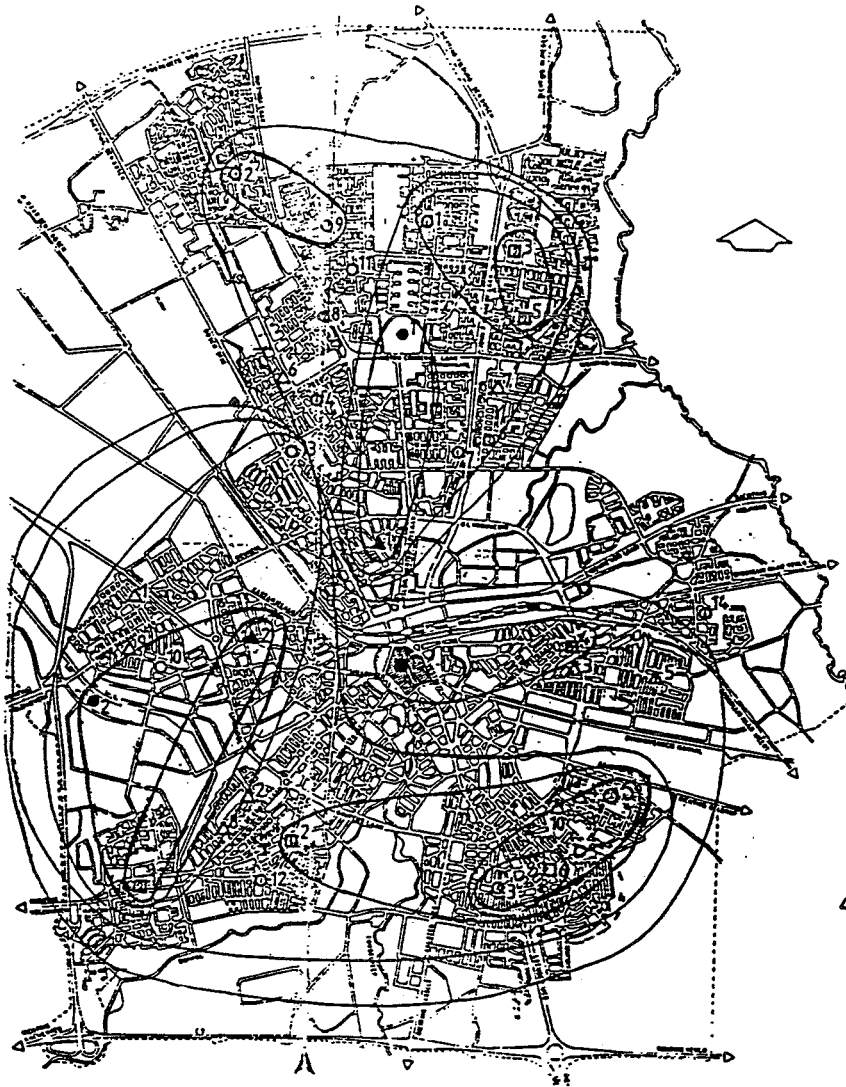


Figure 4



- 1. Binnenstad
- 1. WC. Woensel
2. Koopcentrum De Hurk
- ▲ 1. Kruisstraat / Woenselse Markt
2. St Trudo plein
- ◻ 1. Kastelenplein
2. E. Leherplein
3. Wijngaardplein
4. Hoogdijk
5. Oranjestraat
6. Boulevard - Zuid
- 1. Belgiëplein
2. Barritzplein
3. Roosterlaan / Winkelstraat
4. Hendrik Staelaan
5. Petrus Canisiuslaan
6. Cassandraplein
7. Generaal Coenderlaan
8. Garretsaan
9. Nederlandplein
10. Bredalaan / Theresiaplein
11. Eucharistiaan
12. Tinelstraat
13. Pastoor van Arsplein
14. Karregat
- △ 1. Johan. Buyslaan
2. Schubertlaan
3. Hobbeestraat
4. Moreetslaan
5. Jan van Riebeecklaan
6. De Klerklaan
7. Odysseuslaan
8. Brucknerplein
9. Bredalaan / Noord - Brabantlaan

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