1983

The functional hierarchy of planned shopping centers in Windsor, Ontario, 1982.

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THE FUNCTIONAL HIERARCHY OF PLANNED SHOPPING CENTERS IN WINDSOR, ONTARIO, 1982.

by

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A Thesis
submitted to the
Faculty of Graduate Studies
through the Department of Geography
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1983

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ABSTRACT

Even though the concept of Planned Shopping Centers was considered to be one of the major developments in retailing in the post-World War II era, mainly individual market studies have been done on the subject. The major hierarchical studies done on shopping centers in North America (more specifically, in the United States), mainly dealt with unplanned retail nucleations or business centers. As well, little attention has been paid to the correlation of function and behaviour although the relationship between form and function has often been the focus of investigation on intra-urban retailing patterns.

The purpose of this study, therefore, was to identify a hierarchy and to analyze the functional patterns -- those performed by Planned Shopping Centers within a medium-sized industrial city, namely the City of Windsor -- by the utilization of the Central Place Concept. Planned Shopping Centers can be defined as groups of commercial establishments which are designed, developed, owned and managed as units with off-street parking provided on the property. Four criteria, anchor tenants, population served, floor area and site area were used to classify the planned centers (twenty-one in all), into three groups. The power change or the degree of variation of the shopping centers' levels was studied through analyses of the trade area characteristics as well as the structures of the functional units and consumer behaviour characteristics and the kinds of central place characteristics existing were determined.

The findings gave evidence to the existence, among the Planned Shopping Centers of Windsor, of central place characteristics by means of all the variables with one exception and the changing power of these variables shows a clear variation between shopping center levels.

It was also found that many centers deviated from each groups theoretical characteristics, mainly in the lower level, and marketing approach was used to analyze the reasons.

To My Parents

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to Dr. Jack C. Ransome who, as my primary supervisor, gave me academic guidance and encouragement from the beginning to the end. Dr. Anthony Blackbourn (who admitted me to this program), and Dr. Tony Faria, for their constructive criticisms and helpful comments on this research, are also gratefully acknowledged.

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Finally, I wish to thank my family, especially my sister, Shanthi, for her faith in me and her courage in giving me financial support at the very beginning.

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Chapter I

INTRODUCTION

The concept of planned shopping centers has been generally accepted as one of the major developments in the post-World War II era. it is estimated that there are 20,000 shopping centers of various sizes in operation in Canada and the United States (Edgar, Lion, 1976). Planned shopping centers can be defined as groups of retail stores and related business facilities which are designed, developed, operated and managed as units. On-site parking facilities are provided and their sizes are usually commensurate to the sizes of the individual centers. The types and sizes of the shops they contain are, in general, related to the trade areas intended to be served (Carpenter, 1978).

The evolution of planned shopping centers was a direct consequence of rapid suburban growth, the ensuing decentralization of population in larger cities causing the formation of "settlements" away from core areas but within metropolitan boundaries. In addition, economic prosperity and rising automobile ownership have contributed to changes in shopping habits. The resultant spatial patterns in North America were not influenced (except to a limited extent), by civic planning departments such as was and still is the case in Great Britain and many other countries in the world. However, within these spatial patterns, there exist hierarchical orders.

The notion of hierarchy has been used to describe the functional relationship between settlements as exemplified by retail activity. This concept of hierarchy has also been employed as an organised framework

within which to differentiate levels of size and importance for the main shopping centers of settlements. With this concept as a basis for their studies, it was found that ordered hierarchies exist and prevail in urban areas by size, functions and trade areas and have been identified by several researchers in the United States (Berry, 1958, 1963; Garner, 1966).

A careful analysis of the structure of the functional units and trade areas as well as an analysis of the demands of the consumers and their shopping habits is required in any attempt to gain an understanding of the functional patterns and hierarchy, and this will be the objective of the following work.

1.1 PURPOSE AND SCOPE

The purpose of this study is to analyse the functional patterns - those produced by Planned Shopping Centers within a medium-sized industrial city - specifically the city of Windsor, Ontario. The central place concept will be used and the study will be organized in the form below:

1. Classification of the shopping centers into groups from lower level to higher level using scatter diagrams and the Urban Land Institute's Shopping Center Classification Code System.
2. Analysis of the power of attraction of various shopping center types and determine what central place characteristics exist among those classified levels by means of:
   a) an examination of the trade area characteristics (size, shape, population and customer density), in the classified

groups.

b) an examination of the functional structure characteristics (types of shops, floor area by functional use, etc.), in the classified groups.

c) an examination of consumer behaviour characteristics in the classified groups.

Following the intensive research into central place networks that took place in the 1960's, more recent contributions have been less numerous but can be welcomed for raising some previously neglected issues (Warner and Daniels, 1979), Intra-urban Hierarchical Studies by Berry, (1958, 1963) and Garner (1966), are considered to be the major shopping center studies in North America, but they deal mainly with unplanned shopping centers. Little attention has been paid to the development of planned shopping centers which is believed to be a major one in retail structure in the post-World War II era.

The relationship between form and function has often been the focus of investigations on intra-urban retailing patterns (Cohen and Lewis, 1967), but less attention has been given to the correlation of function and behaviour (Johnston, 1969). In comparison with research done in the United States, very few studies in these areas have been submitted in Canada, and for the most part, marketing study or research has been done only for individual stores. Therefore this study will also emphasize consumer behaviour such as modes of transportation, frequency of visits and other factors.

The highly competitive nature of modern retailing as well as the demand for large financial investment and long-term commitments placed

on the retailer indicate that there is great need for such studies to be done in order that costly mistakes in store site selection might be avoided.

The shopping center industry - yesterday's revolution in retailing - has reached a measure of maturity. This does not mean, though, that shopping center expansion is at an end. Some new shopping centers are being built in growth areas such as Edmonton (despite the prevalence of a "no-growth" economy), and in some places, older planned shopping centers have been expanded or remodeled. In the next few years, most shopping center investment in Canada will be devoted to expansion and/or renovation of existing centers with an effort to add specialty shops, offices and fewer common services. In order to gain a better understanding of the planned shopping centers and the factors which determine their trade area patterns and customer shopping behaviour, a study at micro level is necessary.

1.2 IMPORTANCE OF STUDY

This study can provide an insight into the successful location of shopping centers and their hierarchical order as well as into the factors responsible for that order observed in the area within Windsor's city limits. Such results can be useful to those concerned with trends in the changing economic, social and environmental conditions in Windsor with a view to providing an explanation for the factors which induced the spread of local shopping centers. This knowledge might be vital to the planning of housing and the provision of other services.

Research for this paper disclosed that the Planning Department

of Windsor City Hall had no firm concept or definition of shopping centers in its City Directory Law Book although the various dates of construction were available (see table 1). Retail service establishments, for example, limited wholesale as well as some ancillary uses such as schools and clinics are all categorized under the heading of Commercial Establishments. Neither a shopping center study nor a detailed retailing map had been produced by the City Planning Department even though the total retail sales for 1979 were $789,500,000.00 (Financial Post, 1980, p. 395). By looking at the present theory and quantitative results of consumer behaviour, therefore, city planners might be guided in the planning of commercial activities or shopping centers in the Windsor area. Furthermore, this inventorial and consumer behaviour study might be of help to investors and developers by indicating the present retail trends and possible future locations in the City of Windsor.

1.3 STUDY AREA

The study area is the City of Windsor (figure 1), Canada's southernmost city and one of the earliest settlements in Ontario. It is strategically situated across from Detroit, Michigan, at the tip of the Essex County peninsula formed by Lake St. Clair, the Detroit River and Lake Erie and is one of the busiest and most internationally important gateways to the United States.

Windsor is today, one of the most highly industrialized communities of its size in the whole country. In addition to the automotive industry, Windsor possesses among other technologies, a wide variety of subsidiary industries directly associated with the manufacture of automobiles. The city's economic welfare, therefore, is largely dependent

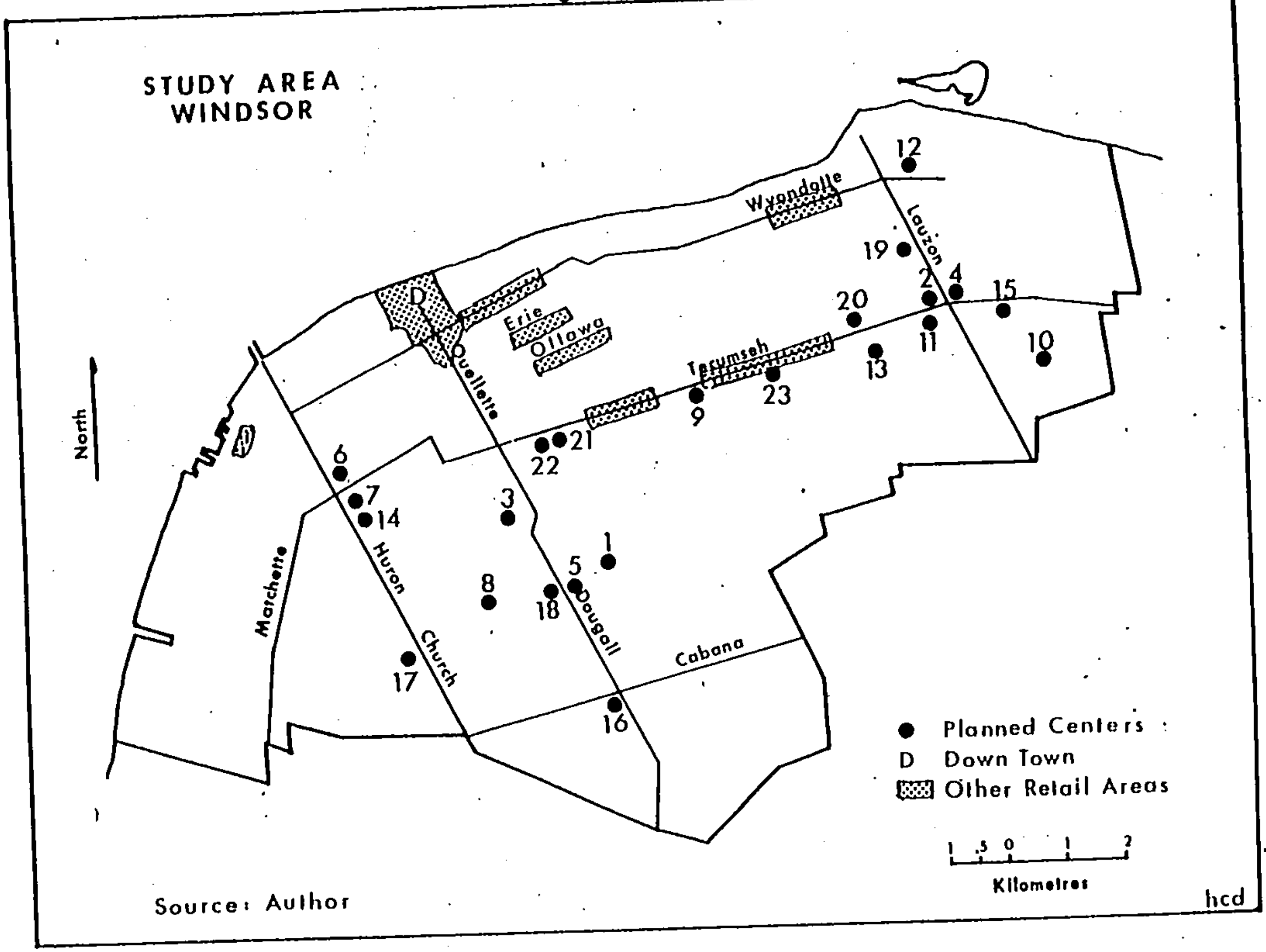
Table (1)

PLANNED SHOPPING CENTERS IN WINDSOR - 1982

ID#	Center	Date
1.	Devonshire Mall	1969-70
2.	Tecumseh Mall	1962
3.	Dorwin Plaza	1956
4.	Eastown Plaza	1965
5.	Gateway Plaza	1962
6.	University Mall	1972-73
7.	Ambassador Plaza	1958
8.	Yorktown Plaza	1946
9.	Central Mall	1977
10.	Forest Glade Plaza	1975
11.	Pickwick Place Plaza	1979
12.	Village Market Plaza	1970
13.	Jefferson Plaza	1976
14.	Huron Plaza	1978
15.	Gladeview Plaza	1980
16.	Dougall/Cabana	1951
17.	Lambton Plaza	1981
18.	Hampton/Rivard	1979
19.	Lauzon Plaza	1977-80
20.	Eastgate Plaza	1980
21.	Tecumseh/Howard Plaza	1980
22.	Jackson Plaza	1979
23.	Market Place Plaza	1952

Source: City of Windsor Planning Department

Figure 1


STUDY AREA
WINDSOR
North
Wyandotte
Lauzon
Erie
Ottawa
Tecumseh
Ouellette
Dougall
Huron
Church
Cabana
Marchette
D
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Planned Centers
D Down Town
Other Retail Areas
1 .5 0 1 2
Kilometres
Source: Author
hcd

upon the strength and stability of this industry.

Windsor's 1982 census figures show a population count of 197,000 which reflects a decrease of 0.1% from the 1975/80 tabulation. This change is due in no small part to recent national recessive tendencies with their resultant cut-backs and lay-offs in the automotive and related industries. The unemployment percentage for 1981 has increased by 10% to (in 1982), 13% according to Statistics Canada figures and this has had a deleterious effect on consumer behaviour in Windsor. Past prosperities, however, did create numerous and specialised retail functions in this city and brought into existence more shopping centers than are to be found in any other community in the region. Presently there are approximately 1,500 retail establishments in which 13,500 people (or 14% of Windsor's labour force), are employed. Retailing, then, is yet another important industry in this city, making its Planned Shopping Centers deserving of an in-depth study such as this.

While several studies have been made on retail business in the Faculty of Business Administration, University of Windsor, they have not dealt with locational analysis in any depth except one by Guy (1974), who did a thesis on convenience food store locations. All other marketing studies done so far have been centered on decision-making techniques dealing with a particular store. Furthermore, no studies were made on retailing in the Geography Department at master's level although Jean-Paul Barrette did a proposed supermarket location viability study in 1978 to fulfil his undergraduate study requirements in Geography. Inadequate research on both the academic and civic levels along with the economic factors are the basic reasons behind the choice of the present study area.

There are twenty-three planned shopping centers identified in the study area (see figure 1 , table 1) and for the sake of convenience, they have been numbered 1 to 23 inclusively with these numbers being used for future analysis. Numbers 22 and 23, Jackson Plaza and Market Place Mall, were excluded from the study because at the time the survey was conducted (May - June, 1982), the former was vacant and the latter merely contained several temporary establishments of the flea market type which were deemed to be unsuitable for inclusion in this study.

1.4 RETAILING HISTORY IN THE CITY OF WINDSOR

Local retailing has a history dating back to the middle of the nineteenth century when Windsor's shopping district began with a single street strip center. In 1854, the year of Windsor's incorporation as a city, Front Street (later renamed Sandwich Street and still later, Riverside Drive), was its only shopping district and was made up of fewer than twenty stores and hotels along with several residences. It was not until 1882, when it was extended and opened as far as the river, that Ouellette Avenue came into prominence as a shopping district and became the town's main street. From that date onward, there was a gradual move southward with stores being established on Chatham Street, old London Street (now University Avenue), and Park Street - in locations immediately east and west of Ouellette - with Wyandotte Street becoming the next real center of retail business. Thereafter, as the town expanded (radiating outward from its hub at Ouellette and Sandwich), retail development was established on Erie and Ottawa Streets to the south, Drouillard Road to the east, with Tecumseh and Walker Roads to the southeast constituting other retail districts which accommodated farmers commuting from rural areas to the town's market place.

Windsor's long-time involvement in retailing was affected and influenced in customer behaviour and locational patterns when, in 1904, the momentous institution of the automobile industry brought about an increase in both the size of the population and its financial income. The ethnic and cultural diversity of its citizens also played an extremely important part, over the years, in the evolution of what used to be known as the Border Cities - Riverside, East Windsor (which prior to 1929 was known as Ford City), Walkerville, Windsor and Sandwich. The latter four were amalgamated in 1935 and were known thereafter as Greater Windsor with the city of Riverside resisting annexation until 1966.

Each of the cities had its own shopping district or districts, none of which was specifically developed as an outcome of city planning but grew in strips mainly along major arteries, as the towns grew. The Planned Shopping Center is a relatively recent transpiration in Windsor's retailing history.

Dorwin Plaza, opened in 1956 on the city's south side, is considered to be the first, fully developed Planned Shopping Center in the study area. Other major centers such as Ambassador Plaza (1958), Gateway Plaza (1962), Tecumseh Mall (1962), Eastown Plaza (1965) and Devonshire Mall (1969-70), (the latter being the largest Planned Center in Southwestern Ontario), were all constructed during the period between 1960 and 1970. It should be noted that the development of shopping centers toward the south is very much related to the population growth of the city. The annexation of various towns and townships (Riverside, Ojibway, Sandwich East, Sandwich West, Sandwich South, for example), also played an important role in the acceleration of Planned Shopping Center construc-

tion. However, 50% of the total of planned centers studied for this thesis are all smaller in size than those mentioned above and were developed after 1975. Of the total of those established, 45% are located on major arteries either as replacements for or as adjuncts to retail districts previously in existence.

It is obvious from figure 1, that secondary shopping areas have developed along streets such as Ottawa and Erie. These have been strongly influenced by and are reflective of the cultural/ethnic factors. Wyandotte Street and Tecumseh Road represent arterial development. Planned Shopping Centers have generally developed according to the Multiple Nuclei Theory in relation to urban land use patterns, particularly those of residential land use. However, while smaller planned centers such as Village Market and Forest Glade Plazas are located in the midst of highly residential areas, several other newly developed centers have been located at the edges of residential areas on major arteries. This aberration allows for interesting research on the study area, particularly in the central place field.

Chapter II

REVIEW OF LITERATURE

The Distributive Trades Committee of the National Economic Development Office (1970) has especially recommended that the central place theory and the general interaction theory as well as the land rent theory provide the major framework for studies on shopping centers. They may be used to describe and explain aspects of both the structural system for the supply of goods and services and the spatial characteristics of consumer demand (Davies, 1976). Since this study is mainly involved with the spatial and behavioural characteristics which determine the functional pattern and the hierarchical order of shopping centers, all three theories are relevant to this field. In this section, relevant studies, both theoretical and empirical, are examined.

2.1 THEORETICAL

During the early 1930's, two important theories evolved in retail location. The first is the Central Place Theory and the other is the Interaction Model. The Central Place Theory was originally formulated by the German economist and geographer, Walter Christaller in 1933 when he studied the location, size and nature of markets. In its original and simplest form it presupposes identical consumers able to travel freely in any direction, being distributed uniformly over an unbounded and featureless plain. This theory is based on two concepts: a) the range of a good, and b) threshold.

Range of a good is the distance the dispersed population is willing to travel to buy a good offered at a central place. The good has both an upper and a lower limit to its range. The "upper limit" is the

maximum radius of sales beyond which the price of the good is too high for it to be sold. The upper limit may be either an ideal or a real limit. Ideal limit is the maximum radius which results from the increase of price with distance until consumers will no longer purchase the good. Real limit is the radius determined by the proximity of an alternate center which can offer the good at a lower price at a certain distance from the first center.

The "lower limit" of the range encloses the number of consumers necessary to provide the minimum sales volume required for the good to be produced and distributed profitably from the central place. This has been called the threshold level of the good.

Christaller also suggested a "k" system which is the proportional support given to larger centers and trade areas by smaller centers and trade areas. In the "perfect" marketing case (which is k = 3), frequencies of occurrence follow a rule of three, where for each larger trade area there will be three trade areas at the next lower size order, then successively nine and twenty-seven.

Probably one of the major extensions of the theory has been that of Loesch, who put forward a scheme that extended and elaborated on the Christaller model. Loesch used the same hexagonal lattices for his theoretical landscape, but he did not consider that a fixed k system approached reality. Using a flexible k value, Loesch built up a very different landscape from Christaller, and allowing a variable k hierarchy, the pattern of settlements he produced is much closer to reality. Thus it produces an almost continuous sequence of settlement size, in contrast to Christaller's model which has central places distributed in distinct

tiers.

The contribution of Berry and Garrison (1958) to central place theory is much more distinctive than the others in being firmly rooted to empirical research (Davies, 1976). Under the Christaller and Loesch ideal condition, the result is a system of central places, uniformly spaced within a system of varying sized, nested, hexagonal trade areas. Such rigid theoretical assumptions, even if they were once valid for rural areas, are certainly not characteristic of metropolitan areas (Garner, 1966). Berry and Garrison argue that the assumption of uniform purchasing power may be relaxed if the hierarchical arrangement of business centers rather than a hexagonal trade area formulation is considered the important condition which a model of central place should contain. Further modification enabled the extension of the basic notions of central place theory to the provision of "nucleated" business types within the urban area as a more general theory of tertiary activity. This theory places emphasis on two concepts: 1) the notion of threshold and 2) the range of a good. By concentrating on these concepts, they showed that hierarchies of shopping centers may be obtained inside individual urban areas as well as the settlement system as a whole.

The other main theory in retail activity is the General Interaction Theory. As the name implies, it is essentially a theory of movement rather than a theory of location. In 1931, William Reilly was the first to demonstrate the applicability of gravity models to marketing geography with his law of retail gravitation. Here, it is applied to movement between centers of retailing activities and the consumer's residence. He stated that consumers moved to shop in certain communities

in accordance with a definite "law". He limited his application of his law to very high threshold goods (shopping goods). The law states that two centers attract trade from intermediate places approximately in direct proportion to the population of the two centers and in inverse proportion to the squares of the distances from these two centers to the intermediate place.

EQUATION

$$\frac{T_a}{T_b} = \frac{P_a}{P_b} \left(\frac{d_b}{d_a}\right)^2$$

T_a, T_b = the proportion of trade area drawn to centers a & b
P_a, P_b = the population sizes of centers a & b
d_a, d_b = the distance from the intermediate center to center a & b

Later developments have subsequently made the gravity concept more appropriate for dealing with urban shopping centers rather than settlements as a whole. The variables have been defined in terms much more specific than population size and mileage distance and have come to be known as the attraction and the deterrence factors. The relative declines in frequencies of trips away from centers, characterised as a "distance decay" function, has been shown to approximate a variety of negative exponential curves and hence can take on other values than the inverse square. The case of just two centers competing against each other has been expanded to accommodate a whole system of shopping centers. This in a metropolitan area, involves complicated overlaps of trade areas, (Davies, 1976).

Most of the recent models particularly focus on the relationships

between consumer expenditures and retail sales. The common root formula is:

$$S_{ij} = K_i E_i A_j F(d_{ij})$$

where S_{ij} = expenditures in a center j by consumers in an area

E_i = expenditures available in area j

A_j = a measure of shopping attractiveness at center j

S_j = retail sales generated at center j

$F(d_{ij})$ = a measure of travel deterrence from i to j

K = a constant of proportionality

However, there have always been two particular types of problems to which both the older general models and newer specialised models have been applied. The first concerns the delimitations of trade area dimensions around centers. Reilly's original gravity model has been reformulated to determine the exact position within an intermediate area when trades become split between two competing centers (Davies, 1976). This has been described as a "break point model" and takes the form:

$$D_b = \frac{d_{ab}}{1 + \sqrt{\frac{P_a}{P_b}}}$$

where P_a, P_b = the sizes of centers a and b

D_b = the break-point distance of trade to center b

D_{ab} = the distance between centers a and b

It has been found to be particularly useful to employ the break point model in conjunction with a hierarchical classification of centers. Different levels of boundary lines can then be computed for different

orders of goods. This model reveals little about the profile of distance decay curve in trip frequencies to centers and there also commonly exists an overlapping of trade areas which the model fails to depict (Davies, 1976). However, from this theory, and with empirical observations, it appears that between two centers of similar hierarchical level, their effective trade areas split about halfway, all other factors being equal.

A more recent model by Huff (1963), (who initially tested intra-urban shopping movements), gives greater scope to these considerations. It is formulated as a series of probabilities of consumers choosing to visit one center from a set of competing centers:

$$P_{ij} = \frac{\frac{F_j}{d_{ij}}}{\sum_{j=1}^{m} F_j/d_{ij}}$$

where P_{ij} = the probability of a trip from area i to center j

F_j = the attractiveness of center j

d_{ij} = the deterrence factor

x = an exponent

A stricter definition has been given to the market potential model in more recent attempts to forecast in absolute terms the growth capacities of shopping centers. The most influential has been the Lakshmanan and Hansen Model (1965). The model takes the form:

$$S_j = \sum_{i=1}^{n} C_i \frac{F_j/d_{ij}}{\sum_{j=1}^{m} F_j/d_{ij}}$$

where S_j = total sales in center j

C_i = total consumer expenditures available in area j

F_j = the attractiveness of center j

d_{ij} = the deterrence factor

x = an exponent

This was first formulated to predict the actual sales volumes that would be realised in various major shopping centers in the metropolitan area of Baltimore, Maryland, given alternative policies about their future arrangement.

2.1.2 LAND RENT THEORY

There is a complex interrelationship between intensity of use and the structure of land values. This seems clear from the discussion of VonThunen's theory of economic rent and its relationships to the intensity of land use - the more intensive the use, the higher the economic rent pertaining to a piece of land. In VonThunen's model, this intensity of use depends on location in relation to the market.

As the city grows and expands, outlying business centers will be established, and the major arteries connecting these business centers with each other and with a central business district will become ribbons of commercial and business development. These will form different centers in the hierarchy. As depicted in the diagram (figure 2), the basic feature of the city's "land value" pattern also become clear. Along the main arteries where the business ribbons were, land values stood out as sharp ridges above the general residential value levels and at the intersections, the business center commercial values take a sudden upturn. In 1970, Scott further studied the land rent theory and pointed out that

each type of retail activity has a different rent gradient and this explained the condition of different retail function. He commented that the lot size needed will also affect the rent a retailer is willing to pay.

The arrangement of retail activities within a metropolitan area should be considered within the context of the broader problem of the arrangements of all the region's activities. Generally, land uses are interrelated to each other. Retailing activity, which is a part of the commercial land use, is mainly dependent on better locations. Population distribution, transportation and physical barriers, etc., influence the location of business centers as well as customer movements. Prior to an examination of the retail structure of metropolitan areas, a brief summary statement of a general theory of metropolitan land use is presented.

Three different descriptives of land use pattern have been derived to describe resulting spatial organisation of urben areas. These descriptions indicate that urban land uses are distributed within concentric zones, sectors and multiple nuclei, (figure 3).

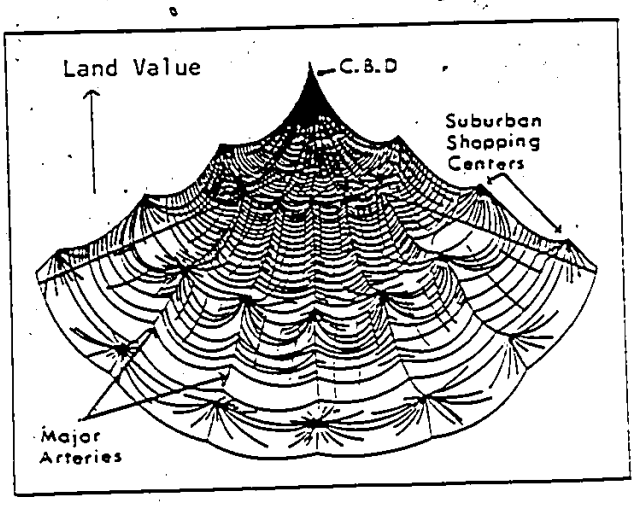
CONCENTRIC ZONE THEORY

The familiar concentric ring concept was developed by Burgess in 1925 to explain the growth of the city. This theory is based on the conception of outwardly expanding concentric rings organised around a dominant central core. The basic processes underlying this expansion were those of invasion, succession, competition, segregation, concentration and decentralization.

Burgess' treatment of the location of retail activities is very

Figure 2

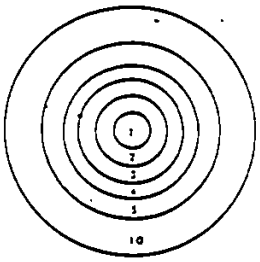
ACCESSIBILITY AND SUBURBAN SHOPPING CENTERS



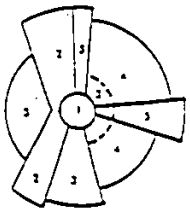
Source: Berry, 1963

Figure 3

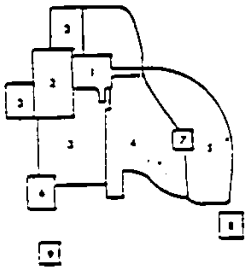
MODELS OF CITY STRUCTURE



CONCENTRIC ZONE THEORY



SECTOR THEORY



MULTIPLE NUCLEI

1. Central Business District
2. Wholesale Light Manufacturing
3. Low-Class Residential
4. Medium-Class Residential
5. High-Class Residential
6. Heavy Manufacturing
7. Outlying Business District
8. Residential Suburb
9. Industrial Suburb
10. Commuters' Zone

Source: Harris and Ullman, 1945

limited. According to his theory, C.B.D., (Central Business District), the core is the main center for the retailing of goods and services. Even though this theory was critisized for being general and overly simplistic, perhaps his most significant contribution to retailing is his recognition of the clustering tendency of particular retail outlets.

SECTOR THEORY

The Sector Theory advanced by housing economist, Homer Hoyt in 1939, considered the entire city as a circle and various areas as sectors radiating out from the center of that circle; similar types of land use originate near the center of the circle and migrate outward toward the periphery along the lines of transportation. The description of residential neighbourhoods in terms of sectors is the essential feature of Hoyt's contribution.

Hoyt devotes more attention to business uses than does Burgess. In discussing the spatial pattern of retail establishments, Hoyt extends Burgess' concept of "centralised decentralization" by acknowledging that business uses are not always limited to the central business district and outlying centers. He notes that "bands of commercial growth or a string-like development of stores may extend out on one or more of the main thoroughfares radiating from the main business center". He also recognises explicitly the importance of accessibility as a factor in retail location (Rogers, 1964).

MULTIPLE NUCLEI THEORY

This theory formulated by Harris and Ullman in 1945, is perhaps the most sophisticated of the "three idealised descriptive schemes" and

is derived from central place theory (Lakshmanan, 1965). It states that there is not a single nucleus of the city that shapes the land use pattern, but a number of separate nuclei, each influencing the land use patterns of the city. In some cities these nuclei have developed as the growth of the city stimulated migration and specialization.

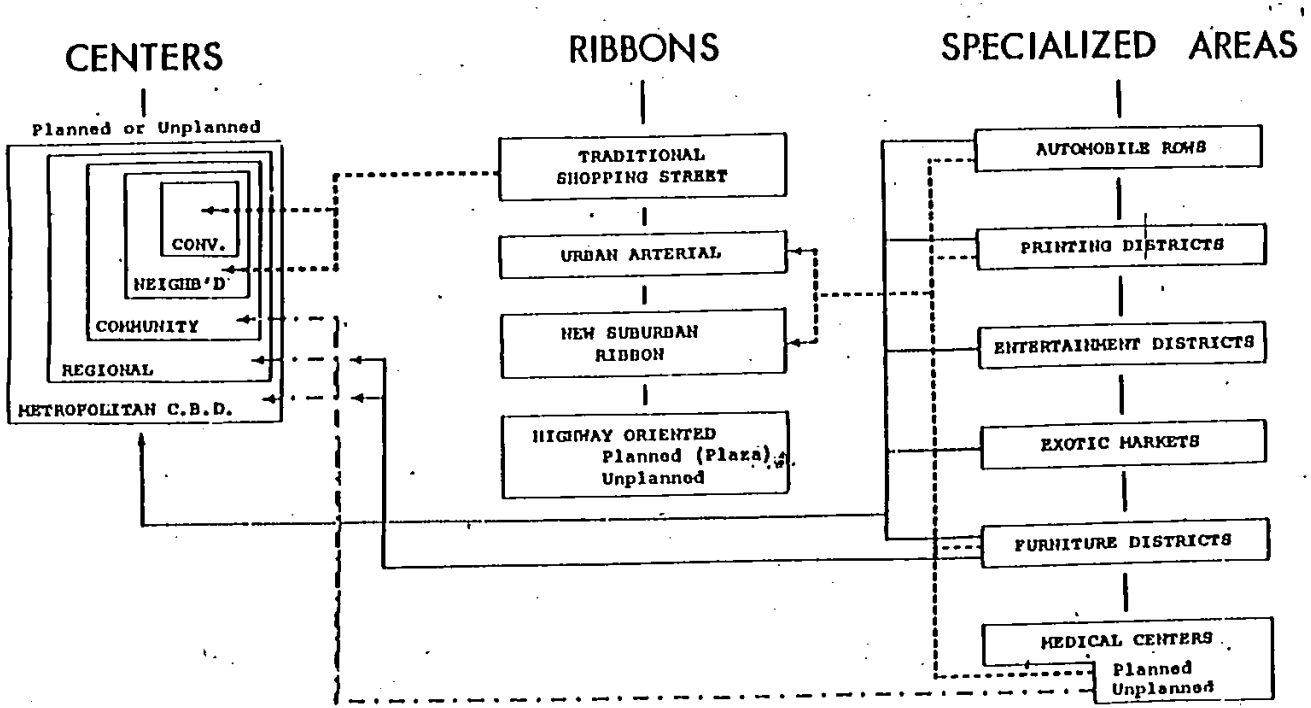
In a later article, Ullman (1962) further supported the multiple nuclei theory. He pointed out first that there is now a general feeling that the C.B.D. may lose its uniqueness, that it may become one of many centers in the city - that other centers would develop on a regional or specialised basis, thus strengthening the mutiple nuclei generalisation. He predicted that outlying planned shopping centers would handle the retail trade for these newly developing nuclei. Harris and Ullman were the first to recognise the outlying business district as a separate land use pattern within a metropolitan area.

It cannot be expected, however, that any of these early theories would exactly fit the real world of modern cities. Jackson (1972) says that more important than trying to amend the theory, is to appreciate the now accepted fact that it is the three models "together" which represent the probable conditions in any one city.

Several authors (Rolph, 1929; Proudfoot, 1937; Ratcliff, 1949), have studied the intra-urban retail structure (see empirical studies for further detail). However, Berry has provided the most definite classification of the modern business pattern in Chicago, (Davies, 1976, p. 120).

According to Berry, "outside the central business district, retail structure comprises four basic components.":

Figure 4



Source : Berry, 1963.

1) Hierarchy of business centers

The nucleated centers consist of unplannes and plannes centers. Most in the central city are unplanned and usually take the form of centers focusing on some major street intersection, although the smaller ones may be strung out as local shopping streets. In sections of the city which have developed in recent decades, many of the centers of neighbourhood and higher levels have been planned on a unitary, integrated basis.

2) Highway-oriented ribbons

These ribbons are natural "strip" developments. They comprise such functions as gasoline and service stations, restaurants, ice cream parlours, motels, fruit stands. In general, the greater the traffic volume, the greater the demand for and density of highway-oriented.

3) Urban arterial development

The large number of commercial functions seek out accessible urban arterial locations in cities. Most of these functions like to have reasonable access to the urban market; but because of space requirements and the ways in which consumers use them, they function most efficiently outside the nucleated business centers. The establishments in this group are usually associated with special single-purpose trips, examples being furniture and appliance stores, automobile repair shops, radio-TV sales and service establishments.

4) Specialised functional areas

These areas are characterised by the presence of several related types of establishments, notably dealerships in new and used cars - "automobile rows" and doctors, dentists, x-ray technicians and so forth, in medical complexes. The epitome of such specialized clusters is found first in the Central Business District and second in the growth of plan-

ned shopping centers where close associations of various retail goods and services develop.

2.2 EMPIRICAL STUDIES

2.2.1 PIONEER WORK

Rolph's Baltimore study (1929) was the first study to demonstrate the existence of a hierarchy of business centers and distinguished them by their functional make-up (Rogers, 1964). The study recognised five types of business areas: 1) a central business district, 2) retail sub-centers, 3) string streets, 4) neighbourhood facility groups and 5) non-concentrated businesses.

Even though Proudfoot's (1937) study was parallel to the Rolph study, he investigated more than one city on the basis of the classes of commodities sold, the character of the customer tributary areas and the nature of concentration and dispersion of outlets. He concluded that the principal cities of the United States, for the most part, possess five types of retail structures. They are: 1) the central business district, 2) the outlying business center, 3) the principal business thoroughfare, 4) the neighbourhood business street and 5) the isolated store cluster. Rogers (1964) states that Proudfoot's investigations significantly extend and support Rolph's analysis, and together these studies provide the first detailed information concerning the disposition of retail activities in metropolitan areas, supplying a firm foundation for future research efforts such as those of Ratcliff.

Mayer's (1942) classification, by contrast focused on peak land values. He sought to cross-tabulate four size-orders of business com-

plexes with six different kinds of shapes: 1) an intersection, 2) cruciform, 3) attentuated cruciform, 4) bimodal and 5) cruciform modified by 1) diagonal and 2) quadrilateral. Both the Proudfoot and Mayer studies sought to discriminate between different typologies of business configurations though Proudfoot gave more attention to their locational and morphological characteristics (Vance, 1962, Davies, 1976), while Mayer looked more closely at their functions and forms (Davies, 1976).

Canoyer (1946) introduced the notion that there are two basic types of commercial areas - viz., cluster types of nucleations and string or ribbon developments. The nucleations include the Central Business District, Community Shopping District and Neighbourhood Center (Beavon, 1977).

Ratcliff suggested that the string street and the nucleations are the basic conformations which characterise the central business district, (C.B.D.). In defining sub-classifications of these two basic forms, Ratcliff concludes with essentially the five-fold typology suggested by Rolph and Proudfoot (Rogers, 1964). Nucleations are divided into the C.B.D., outlying business district and isolated store clusters.

2.2.2 POST WAR STUDIES

It is interesting to nore that post-war studies by Kelly in 1956 and Berry in 1959 and 1963, have demonstrated that the basic retail profile of the urban areas has remained virtually unchanged (Rogers, 1964). Rogers further states that if one employs the classification of neighbourhood, community and regional centers, the result of these studies still indicates a spatial pattern consistent with the findings of Rolph, Proudfoot and Ratcliff. Even though Garner (1964) agrees that these studies were good examples of the level of investigations in the pioneer litera-

ture, he criticizes that these early studies lacked penetration; the pattern of commercial activity was oversimplified. He gives the reasons: 1) in part from the tendency to study at fairly high levels of aggregation (with perhaps Kelly;s work excepted); 2) in part also because of the lack of a sound theoretical framework for analysis; and 3) in part because of an emphasis upon form rather than function. He also said that Berry's study recognised the need for a process-oriented theoretical framework of analysis for the development of more meaningful generalisations and a more viable description of the urban business pattern.

The initial empirical study designed to establish the "type", intra-urban hierarchy (Garrison et al., 1959), was based on the city of Spokane, Washington. The procedure adopted involved the calculation of a correlation matrix (using the Pearson Product-moment Correlation) to estimate the spatial association of each pair of forty-nine business types in the 285 business centers identified in the city. On the basis of the resulting correlation matrix, spatially proximate business types were grouped using a linkage analysis technique (McQuitty, 1957), and the same definition of a group as employed in the Snohomish County study (Berry and Garrison, 1958). For the groups so identified, the correlation procedure was repeated to establish whether groups of proximate business types themselves had distinctive patterns of association. Two distinctive conformations emerged - nucleated and arterial road groups. Following this procedure, average centers were computed to be representative of business centers with only one, two, three, four, etc., business types (Garrison et al., 1959). The same procedure of correlation and linkage was reapplied and a grouping of average centers into four classes emerged. A similar analysis was conducted for the arterial-type centers.

Specific details of the structure of outlying shopping centers can best be illustrated by a study of outlying shopping centers undertaken in the city of Chicago, Illinois (Berry, 1962). Berry used a sophisticated multivariate statistical technique (viz. factor analysis), to analyse the functional compositions of more than 125 business complexes in the metropolitan area. In this study, structural characteristics of 64 outlying shopping centers were analysed using factor analysis. Together, with comparison of the results from Spokane, with the three cities of Cedar Rapids, Phoenix and Cincinnati (Beavon, 1977), they lead to the conclusion that the intra-urban nucleated centers, in general, consist of four basic components:

1) Isolated corner store,
2) Neighbourhood business center,
3) Community business center,
4) Regional business center.

The hierarchy of these centers and their relationship with the ribbons and other specialised areas within the city is shown in figure 4. (above, p. 23).

Following the study of Berry in 1963, it was proven that the theory of tertiary activity had been shown to be applicable to both the inter and intra urban areas. Under the framework of theory, in 1966 Garner identified more than one hierarchy of nucleated outlying business centers in Chicago, based on the relationship between land values and commerical land use. He identified more than one hierarchy of these centers related to spatial difference in socio-economic characteristics of the city neighbourhoods.

2.2.3 CONSUMER BEHAVIOUR STUDIES

It has been noted by Davies (1976), that many more studies of the locational characteristics of shops and shopping centers have been accomplished than of behavioural patterns of the consumers they serve. Even the studies on consumer behaviour are mostly done at the regional level rather than at an intra-urban level. Specifically, no studies have been done for planned centers at an entire city level.

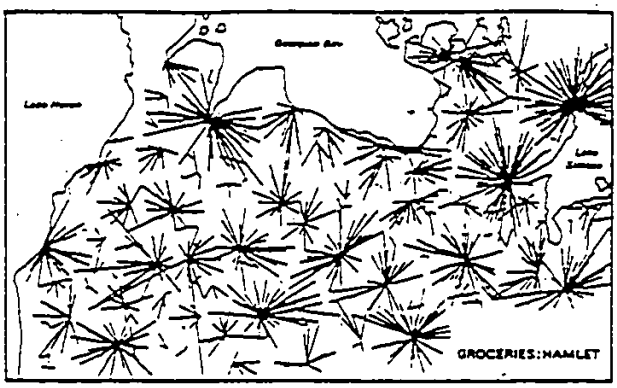
No-one really expects to be able to identify a system of equal-sized hexagons in the real world landscape without recourse to serious distortions or complex transformations of the data itself (Davies, 1976). The main question addressed in connection with central place theory, therefore, has been whether there is sufficient evidence from the recurrent travel patterns of the populations to indicate a systematic use of the various levels of a hierarchy of centers. A common approach towards tackling this has been to plot as a series of flow lines or desire lines, the movement of a sample of consumers for a wide selection of goods and services. A typical example is the study conducted by Berry and others (1962), into the functional use of the hierarchy of centers in Western Iowa. Trips for groceries (low convenience), dry cleaning (high order convenience), furniture (town level good), clothing (city level good), were studied and it was found that higher level places attract consumers over longer distances than lower level places consistent with their higher degrees of centrality (Yeates and Garner, 1972). Moreover, the trade areas of the higher level centers are more extensive than those of lower level places for goods of similar order.

A similar study on functional use of centers examined three goods;

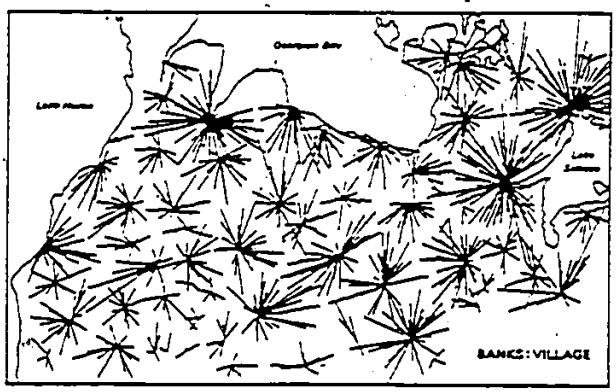
Figure 5

CONSUMER TRAVEL PATTERN FOR DIFFERENT TYPES OF GOODS

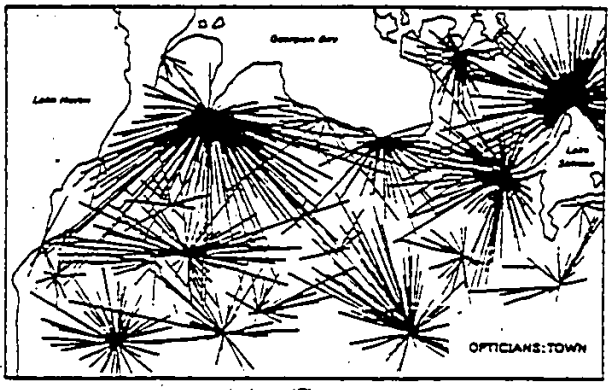
In Southern Georgean Bay Area, 1966.



(A)



(B)



(C)

Source: Thomas & Yeates, 1966

groceries, banks and optitians in the southern Georgian Bay area, and a similar hierarchy was established (Thomas and Yeates, 1966), figure 5.

The evidence provided by this kind of study, however, suggests that the systematic use of hierarchy of centers is wholly dictated by what is available. The orderliness in the patterns of movement is a direct result of the presence or absence of certain goods or services at successive levels of centers. Huff (1961), places emphasis on this and says that the nature of the product being purchased plays an important role. Examination of the spatial movements of shoppers reveals that food for example, is sought in areas nearer home, whereas clothing is predominantly purchased downtown, (higher order of the hierarchy) (Jonassen, 1953). In general, it appears that the average distance that a consumer travels to purchase a convenience good is considerably shorter than a similar trip made to purchase a shopping good (Nystuen, 1959).

Again consumer travel patterns were used in hierarchical studies by Murdie (1965) in Southwestern Ontario. The difference in travel was noted for old order Mennonites and modern Canadians.. The conclusion was that significant differences in travel do exist.

An urban scale study was done by Davies (1973) in Coventry, England, and it was found that there is a clear distinction between those trips which focus on local centers and those which are oriented to the central area. Also disclosed, was that there is very little cross-travel through the city so that a consumer in one area uses the center of another area to a lesser degree.

Despite the different types of goods and centers and the consu-

mer trips, very few studies have considered travel modes and frequency of visits. Although the Coventry study (1973) deals with this somewhat, it failed to consider the variations between centers. Johnston and Rimmer (1969), demonstrated that the higher the order of the center in a hierarchy, the less frequently it is visited. They also found that there is an intensive use of the automobile to visit planned centers, whereas for visits to unplanned centers, automobiles were used less frequently - both types of centers being on the same hierarchical level in Melbourne, Australia.

2.3 DEFINITION OF TERMS

Since the terms "establishments", "functions", "trade area", "convenience goods", "shopping goods" are utilized greatly in this study, the following definitions are used.

Establishment refers to the physical building or structural facility in which the business activity takes place.

Function is used to distinguish a certain kind or type of retail activity or selected service. A retail activity or selected service is commonly referred to as a business activity.

Trade Area is that area from which a store gets its business - where the customers come from. The primary trade area must be thought of as a geographic core from which a store gets the most business. This generally accounts for between 60 and 70 percent (or 2/3) of the store's customers.

Convenience Goods are those which are bought frequently and repeatedly and which the consumers therefore desire to purchase with a minimum of effort, examples being groceries, tobacco products, drug items, etc.

Shopping Goods are those which are generally acquired at periodic intervals - seasonally, annually, and in some instances, only once in a lifetime. Such items are usually unstandardized and are purchased only after considerable comparisons of quality and price are made in a number of competing retail outlets (Rogers, 1964). Examples are furniture, major appliances, shoes and style goods.

Chapter III

METHODOLOGY

3.1 THE MODEL

Berry and Garrison have proven that whatever the distribution of purchasing power and whether in open country side or within a metropolitan area, a hierarchical spatial structure of central places supplying central goods will emerge.

A hierarchy occurs because, to the seller of tertiary activities, different functions have different threshold values and thus demand minimum trade areas of different sizes for their support.

The basic service center would be small with a lower number of establishments and business types and generally located among the highly populated clusters. Their major purpose is to serve the immediate population and therefore they will contain high frequency lower order convenience goods, such as food.

In addition to the frequent needs that the first order center can satisfy, there are goods that are required less frequently - banking and clothing purchases, for instance. A first order center could not afford to sell such items since there would not be a large enough demand from one small tributary area. If several trading areas were added together, however, the total number of consumers they contain could support a center dealing in banking and clothing. Thus a second order center would arise. All the earlier constants would still operate (therefore the establishments and business types will be numerous), except that now

Figure 6

HIERARCHY WITHIN A CITY

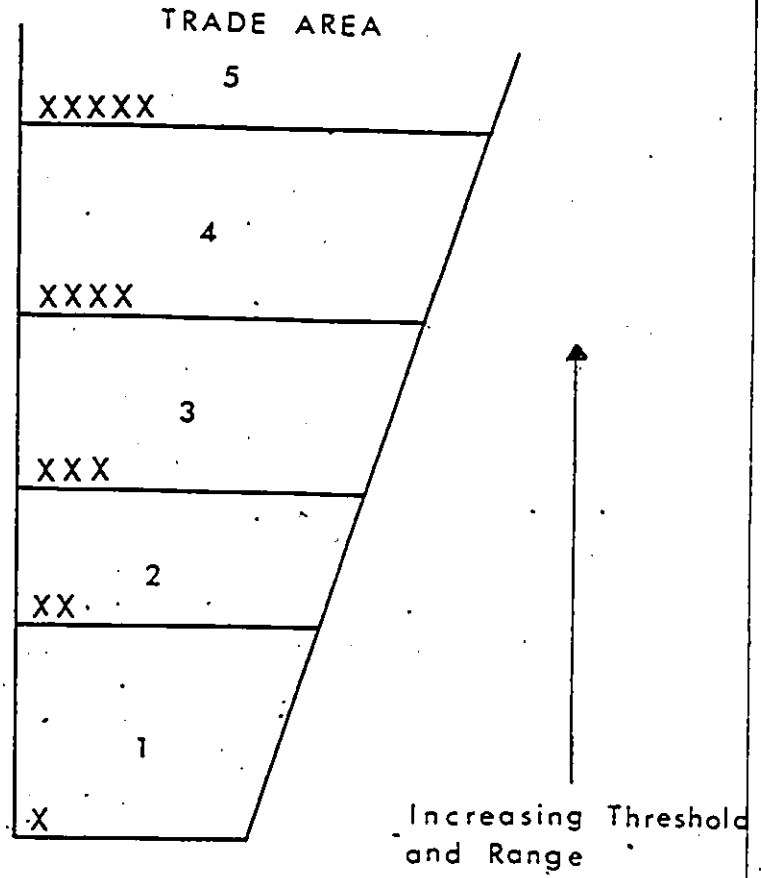
Fifth Level Center
The CBD
Ta = 1+2+3+4+5
Fu = n+20

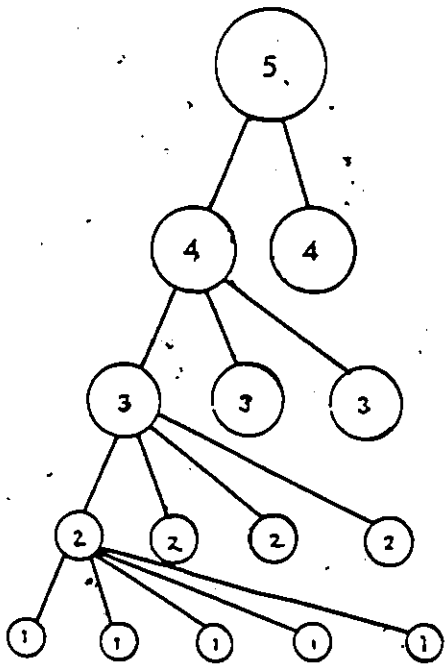
Fourth Level Center
Regional Center
Ta = 1+2+3+4
Fu = n+15

Third Level Center
Community Center
Ta = 1+2+3
Fu = n+10

Second Level Center
Neighbourhood Center
Ta = 1+2
Fu = n+5

First Level Center
Corner Store
Ta = 1
Fu = n





Ta = Trade Area
Fu = Function (X)

Source: Hurst, 1972.

for goods purchased less frequently, a customer would be willing to travel further. Accordingly, there would be fewer second order centers than first order ones and they would be further apart. This process could continue on to a third or even fourth level of centers, each higher order selling less frequently required goods and therefore needing to draw on larger and larger numbers of consumers willing to travel further and further. Each higher order center would also supply a trading area of the order beneath it with lower order goods. Thus a fourth order center would combine all fourth order functions for varying trading areas. (Figure 6).

3.2 HYPOTHESES AND RATIONALE

The overall objectives and purposes of the study will be fulfilled through the testing of various hypotheses. The major purpose of the hypotheses is the analysis of the power of attraction of various shopping center types and the order of shopping centers is measured by a variety of factors such as major tenant, floor area, site area and trade-area population.

1.) Higher order shopping centers have larger trade areas than centers at lower levels in the hierarchy.

It has been noted in previous studies that trade area size reflects the size of the shopping center (Nelson, 1958); Berry, 1963; La Londe, (1962); Jones, (1969); Benson, (1969); Applebaum, (1968). Since the number and the variety of goods and services are greater at the larger centers or at the higher level of the shopping centers, the trade area size also tends to be bigger at this order.

2.) Trade area population density within one mile for small centers is greater than that of the next order shopping centers.

Population densities generally decline with distance from the C.B.D. (which is considered to be the highest level within the city). (Berry et al., 1963). For an establishment with a low threshold and small range, areas of high density might allow a very scattered distribution. Therefore, as residential densities decrease within an urban area, shopping centers should be more widely spaced and their minimum size should increase.

3.) At the lowest level of the hierarchy, the majority of the "customers" are within the first half-mile radius from the shopping centers, whereas at the highest level, customers are further away.

Even though this hypothesis seems similar to the previous one, it mainly deals with the total (trade area) population. It is natural to expect that customers will choose the closest center which will serve their need. Theoretically, the closer to the consumer a facility is, the most attraction it will hold for that individual (Claus and Hardwick, 1972).

4.) Shopping goods take on a larger role in the higher order of shopping center than in the center of lower orders.

Consumers would be willing to travel further for less frequently purchased goods. Therefore, the number of establishments and functions of shopping goods would be larger at the higher order center. Moreover, the larger the center, greater the specialisation possible.

5.) At the higher level of the hierarchy, the largest proportion of the total floor space is devoted to shopping goods, whereas, at the lower level, it is devoted to convenience goods.

This was proven in Garner's 1966 study, and it is expected since the number of establishments for shopping goods is larger in higher level

shopping centers. The floor area proportion should also be higher, therefore, than in the lower levels.

6.) There is a sharp difference between lower order centers and the higher order centers in distance travelled for convenience goods as compared to that travelled for shopping goods.

Since the shopping goods are less frequently purchased, customers are willing to travel a further distance (Nystuen, 1959; Berry, et al., 1962; Thomas and Yeates, 1966; Murdie, 1965; Davies, 1976).

7.) The proportion of shoppers who travelled by car to a center will decrease from higher order center to lower order center.

Since the high order centers would be located further apart, it is apparent that customers would use automobiles, whereas they might walk to the closest lower level center. This was tested by Johnston and Rimmer (1969), between planned and unplanned centers in Melbourne.

8.) The higher the order of a center in a hierarchy, the less frequently it is visited.

This hypothesis deals with shopping trips. Goods sold by different types of establishments and bought at varying frequencies by the population produce a continuum of threshold and range values (Johnston, 1973). Since the higher order centers have the shopping goods and are dispersed further apart, the tendency to visit these centers would be less than that for the lower level centers.

9.) The percentage of shoppers for convenience goods increases from the higher order to the lower order, whereas the percentage of customers for shopping goods decreases.

Since the higher level centers have more specialty functions, it is expected that the consumers who come to purchase these goods should also be in higher proportion.

10.) The percentage of single shoppers decreases from the lower order to the higher order centers whereas the percentage of couples and families increases.

Since the larger centers are closed malls with a pleasant atmosphere and leisure activities, the number of business types greater and the volume of purchasing larger, more than one customer for a single trip is to be expected.

3.3. DATA SOURCE

In order to fulfil the purpose of the study, data were gathered through secondary sources as well as by a questionnaire survey. Data for the analysis of the functional units were obtained by means of the former. The Shopping Center Directory is a useful data source for a shopping center study, but since the current (U. S.) directory doesn't include the Canadian shopping centers, it was necessary to obtain relevant data by other means. Data regarding the gross leasable area and number of establishments were obtained through the courtesy of the City of Windsor Planning Department but information regarding the floor space of individual stores was not included. Floor space data were provided mostly from the owners or leasing agents of the centers. All these data were checked and information regarding the business types were obtained by means of field work.

To locate the trade areas of centers, driving time between selected centers within each class was considered. However, during the field

work period of data collection, it became evident that trade areas for shopping centers could not be determined so simply. The most compelling reason for discarding this approach was that it neglects all retail areas that do not meet the definition of "shopping centers". Several of the larger retail areas outside the C.B.D. are older neighbourhood strip shopping areas that have grown through the years to nearly equal the size of the major shopping centers - Ottawa Street, for example. It is unrealistic to divide even a part of Windsor into shopping center trade areas without evaluating the roles of these strips' retail developments.

Reilly's Law was also rejected because there was a difficulty in getting population data for each center. This difficulty could have been overcome by applying floor space, but it cannot be assumed that two shopping centers with equal physical plants would have the same drawing power. Mainly, the types of business offered, historical precedent, aggressive promotion or a combination of these can give a shopping center drawing power disproportionate to its size. Furthermore, Reilly's Law is at best only an approximation technique and it applies better for towns than for intra-urban patterns. In metropolitan areas, competition is to be found in so many different directions and at so many different scales that the researcher often finds it preferable to determine trade areas by the direct use of customer addresses obtained during store interviews or from automobile registrations. Since this study, along with trade area size also deals with consumer behaviour patterns, a personal survey was carried out at each center. Interviews were taken for this particular study mainly according to Epstein's (1961) methodology.

Since common walls and parking lot make a physical unit of a plan-

ned shopping center, the parking lot is the most practical place in which to conduct interviews. Most planned centers are set back from the street so that a customer who walks or cycles or uses public transportation can also be easily interviewed. The interviewer (depending on the size of the center and the layout of its parking lot), worked at random locations within the parking lot area and since customers were interviewed in the parking lot on their way out, each interview was handled with tact and dispatch.

The order in which the questions are listed and are asked is designed to save time and also to insure adequate opportunity to obtain the respondents' home addresses (the item of information about which the greatest resistence, if any, is encountered).

Even though it was known that the number of customers interviewed should be in accordance with the total sales, because of the confidentiality of sales data as well as the great number of centers (twenty-one in all), a random sample of customers was chosen according to the size of the center and its major tenant. For Devonshire Mall two hundred customers were interviewed and one hundred and fifty for each of the University, Tecumseh, Eastown, Dorwin, Ambassador and Gateway Malls and Plazas. One hundred customers were interviewed for each of the rest of the individual centers.

3.4 DATA ANALYSIS

After the data were collected, the centers were first grouped from lower level to higher level. The structure of the functional units as well as trade area characteristics and consumer behaviour were analy-

sed in order to determine the power of attraction of shopping center types and to learn what central place characteristics exist among the planned shopping center levels.

Previously, a preliminary analysis had been done to determine the trade area sizes and shape patterns, using the customer spotting method. First the customers' addresses (obtained from the questionnaire survey), were plotted on a base map. Circles or zones with half mile radii were drawn and customers within each zone were counted. (The half mile measurements for radii were used so that comparisons with other studies could be easily made and half kilometer distances were deemed to be too narrow for this analysis. (As well, other studies have used "miles" and not kilometers.) Next the boundary of the primary trade areas (which comprised two thirds of the total customers interviewed), was drawn with the help of the "land-use map". Using the Digitizer, measurement of the trade area size was taken next and finally an up-dated population dot map was used to determine the exact trade area population served.

Upon completion of the above processes, the analysis was carried out in three parts:

Part 1. Firstly, planned shopping centers were grouped and classified from lower lefel to higher level using the scatter diagram. The number of establishments was used in the Y axis (instead of the number of business types), because even though some centers had larger floor areas and more department stores, the total number of business types was less, an example of this being Eastown Plaza. After the groups were formed, the mean figures were tested through two sample "t" tests to learn the statistical significant. The "t" observed was computed through following formula:

$$t_{obs} = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1 - 1} + \frac{S_2^2}{n_2 - 1}}}$$

$\bar{X}_1$ = Mean figure of the first group.

S_1^2 = Standard deviation square of the first group.

n_1 = Number of samples in the first group.

For the significant level, degrees of freedom was = $n_1 + n_2 - 2$. (Dr. Lavalle's notes). These tests substantiated the findings of the scatter diagram. Finally, the groups were named by means of the Urban Land Institute Shopping Center Classification Code (1963).

Part 2. In this section, trade area characteristics as well as functional mix characteristics were analysed in the classified groups. The Pearson Product Moment correlation was used for the trade area size analysis and the significance tested with a students "t" test whose formula is written as:

$$t = \frac{r\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$$

where n - 2 are the "degrees of greedom" and r is the correlation coefficient (Toyne and Newby, 1974). Two sample "t" tests were used to test the group mean difference.

In addition to the description of the visual shapes of trade areas, they were measured in ratios involving some parameters which might give

some basis for comparison between the shape of one geographical feature and another. By the provision of continuous variables, an objective comparison might also be shown (Fitzgerald, 1974).

The basic parameters used were trade areas and the length of the longest axis:

$$\text{eg.} \qquad S = \frac{A}{0.866\ L}$$

A = Area shape being measured

L = Length of longest axis

Because of the nature and complexity of larger centers, a different formula - the Boyce-Clark Method - was used to obtain the exact shapes (Yeates, 1974). The index can be represented mathematically as:

$$SBC = \sum_{i=1}^{i} \left| \frac{ri}{\sum_{i=1}^{n} ri} 100 - \frac{100}{n} \right|$$

where SBC = the Boyce-Clark shape index

ri = the length of the i th radial

r = number of radials

Cumulative percentages and cartography techniques were used in the analysis of consumer locations and population characteristics.

Different types of shops related to central places were analysed using the Pearson Product Moment Test. The coefficient of correlation (r) will range between +1 and -1 and the closeness of approximation to 1 is a measure of the closeness of the relationship of the two components (eg. the population of shopping centers and the types of shops found in them).

This test was chosen over Rank correlation test because it provides a stronger measure of correlation since the differences in actual values are used rather than merely the respective rank orders of the two variables.

Part 3. Consumer behaviour was analysed by cumulative percentage and Cartographic Methods. Finally, a Discriminant Analysis was used to determine which of the centers deviated from the criteria of the classified levels. According to the analysis there must be at least two observations in each group. The SAS Computer Manual was used to run this program.

Chapter IV

ANALYSIS

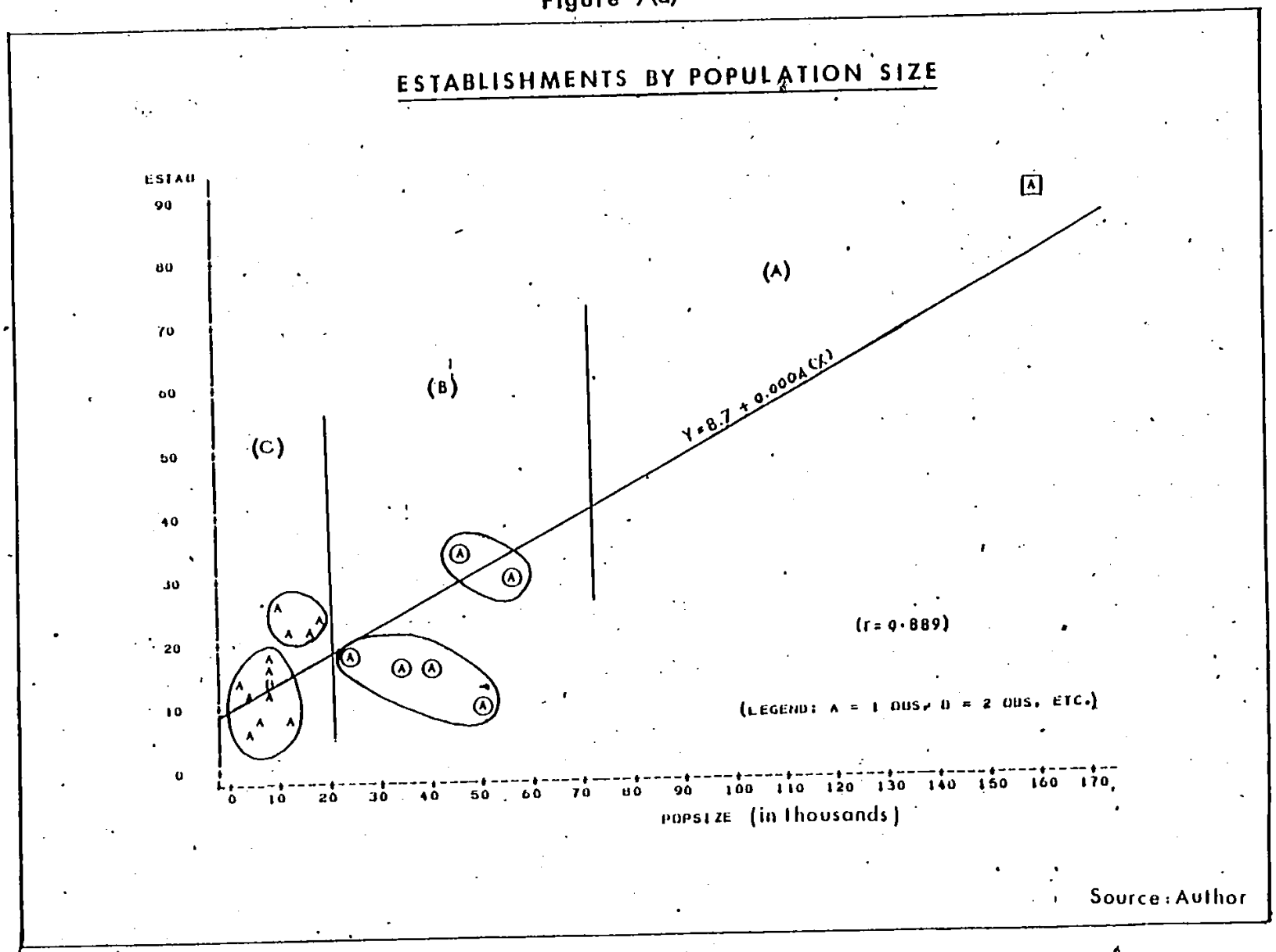
This analysis chapter will be divided into three parts. In the first page, shopping centers are classified into three major groups. The second part consists of the analysis of the structure of the functional unit characteristics such as floor space area, business type, etc. The third part involves the analysis of consumer behaviour characteristics.

4.1 CLASSIFYING THE SHOPPING CENTERS

The classification of shopping centers was done by making use of the scatter diagram which was based mainly on four major criteria - total population served, gross leasable area, total site area and major tenants. The Urban Land Institute Classification Code (1963) was used to confirm the major groups.

Population served was the primary criterion in this particular study since it relates to functional hierarchy. First, data from the matrix establishment and the population served for each of the shopping centers were plotted on a scatter diagram form (figure 7a). In that figure, three groups of shopping centers (A, B and C) are apparent. In group A, there is only one shopping center - Devonshire Mall - whose total number of establishments is eighty-eight, and the population served

Figure 7(a)



ESTABLISHMENTS BY POPULATION SIZE

Source: Author

Table (2)

FUNCTIONAL BASES OF PLANNED SHOPPING CENTERS IN WINDSOR

	Center	Floor Area (S/F)	Population Served	No. of Establishments	Function	Site Area (Acres)	Major Tenant: Department Store	Major Tenant: Supermarket	Major Tenant: Convenience Store
1.	Devonshire	907,415	159,250	88	38	68.0	3	1	
2.	Tecumseh	256,097	56,050	29	18	28.0	2	1	
3.	Dorwin	209,836	45,200	33	24	17.1	1	1	
4.	EastTown	195,483	50,450	9	9	18.3	1	1	
5.	Gateway	187,700	24,250	17	14	18.4	1	1	
6.	University	147,885	39,700	16	15	13.1	1	1	
7.	Ambassador	142,300	33,150	16	12	11.4	1	1	
8.	Yorktown	78,733	16,650	22	16	4.8		1	
9.	Central	69,552	17,000	24	16	6.4		1	
10.	Forest Glade	69,445	9,250	25	18	4.9		1	1
11.	Pickwick Place	57,169	12,800	22	14	4.2			1
12.	Village Market	40,222	8,200	12	8	1.9		1	1
13.	Jefferson	24,165	6,300	7	6	1.5			1
14.	Huron	20,776	7,500	14	10	1.4			
15.	Gladeview	16,564	3,800	11	9	1.3			1
16.	Dougall/Cabana	15,202	8,300	19	10	1.5			1
17.	Lambton	15,030	1,200	13	4	1.2			1
18.	Hampton	14,767	7,350	15	10	0.8			1
19.	Lauzon	14,241	7,600	13	10	1.1			1
20.	Eastgate	13,630	11,300	7	4	1.2			1
21.	Tecumseh/Howard	5,644	4,200	5	4	0.9			1

Sources: City of Windsor Planning Department
Metro Construction Company
Field Work

Figure 7(b)

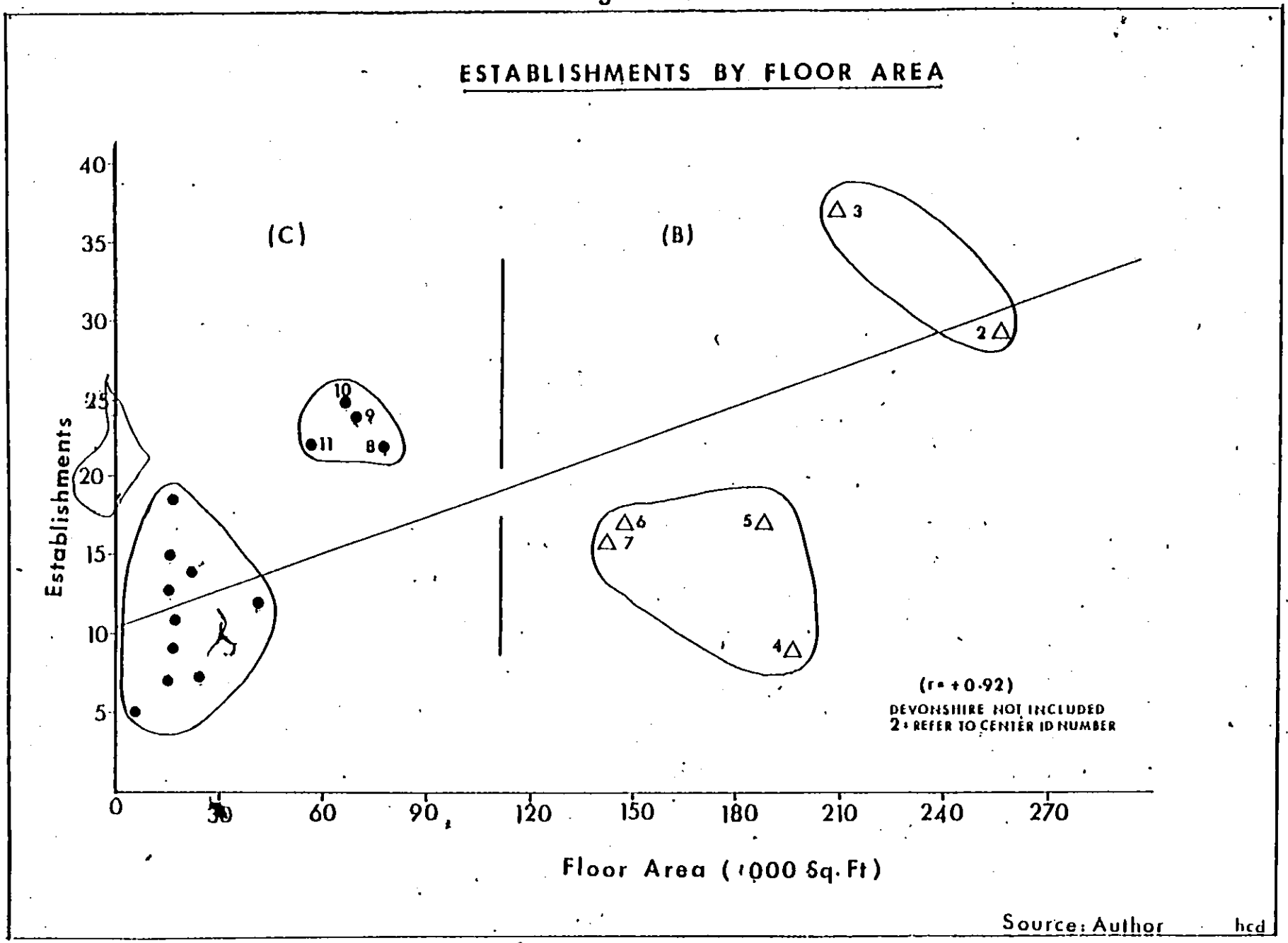

ESTABLISHMENTS BY FLOOR AREA
(C)
(B)
Establishments
40
35
30
25
20
15
10
5
0
30
60
90
120
150
180
210
240
270
Floor Area (1000 Sq. Ft)
(r = +0·92)
DEVONSHIRE NOT INCLUDED
2 = REFER TO CENTER ID NUMBER
Source: Author
hcd

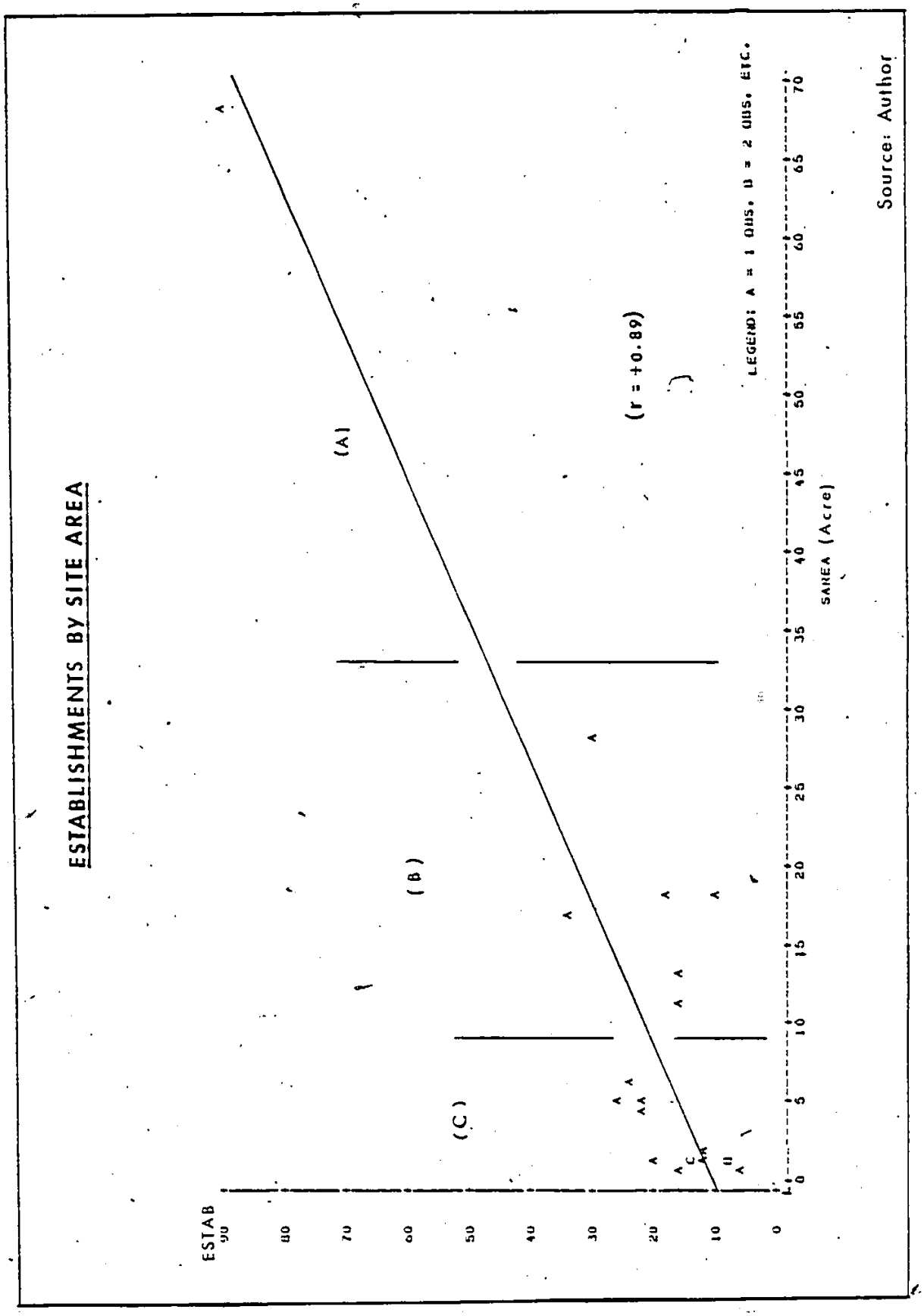
Table (3)

CLASSIFICATION CODE OF SHOPPING CENTERS

	Major Tennant	Average Gross Floor Area	Average Minimum Site Area	Minimum Support (Threshold)
REGIONAL CENTER	Dept. Store	400,000 Square Feet (S/F)	40 Acres	70,000 to 300,000 Families or 100,000 + Persons
COMMUNITY CENTER	Jr. Dept. Store or Variety Store	150,000 Square Feet	10 Acres	5,000 Families or 20,000 to 100,000 Persons
NEIGHBOURHOOD CENTER	Super-Market or Drug Store	40,000 Square Feet	4 Acres	1,000 Families or 7,000 to 20,000 Persons

Source: Urban Land Institute, The Dollars and Cents of Shopping Centers (1963)

Figure 7(c)


ESTABLISHMENTS BY SITE AREA
ESTAB
AREA (Acre)
LEGEND: A = 1 OBS, B = 2 OBS, ETC.
(A)
(B)
(C)
(r = +0.89)
Source: Author

totals one hundred and fifty-nine thousand, two hundred and fifty (159, 250), as derived from the population distribution map (figure 13). (The corridor stores, gas stations and auto parts and service centers of any of the shopping centers are not included in the study). In group B, the number of establishments ranges from nine to thirty-three, and the population served from twenty-four thousand, two hundred and fifty (24,250) to fifty-six thousand and fifty (56,050). In the third (C) group, the number of establishments ranges from five to twenty-five and the population served ranges from twelve hundred (1,200) to seventeen thousand (17,000). The mean population served by the C group centers is eight thousand, six hundred and seventy-five (8,675), whereas the mean population for B group is forty-one thousand, four hundred and sixty-six (41, 466). These mean figures were tested using a two sample "t" test and it was found that they differ significantly at 99.9% probability level. Unfortunately, because of there being only one center in the type A group, it was not possible to test it against the type B group.

Next a comparison of these centers was made using the Urban Land Institute Classification Code System, which indicated that all three types of centers (A, B and C), fit exactly into the Regional, Community and Neighbourhood classifications for centers according to the population served (table 2). Tecumseh, Dorwin, Eastown, Gateway, University and Ambassador centers fall into the Community center category which usually serves from twenty thousand to one hundred thousand people according to the coding system. Devonshire Mall alone falls into the Regional center category since it serves one hundred and fifty-nine thousand, two hundred and fifty people. All the other centers fall into the Neighbourhood group which serves between seven thousand and twenty thousand people.

In addition to the testing by population size, the gross floor area comparison was used and the results confirmed the classification of the three groups obtained in the earlier test. Figure 7b shows that the floor space of the shopping centers is highly correlated ($r = 0.920$) with the number of establishments and also that there are three distinct groups according to floor area. Devonshire Mall, which falls into the A group, is far greater in size than the centers of the other two groups, therefore it does not appear on the graph. Group B centers floor areas range from 142,300 s.f. to 256,097 s.f., with the same number of establishments given above, while those of C group range from 5,644 s.f. to 78,733 s.f. The mean gross floor area for neighbourhood centers (32,510 s.f.) was compared with the mean value of community centers (189, 833 s.f.) and it was confirmed that there was a significant difference between these two groups at a 99.9% probability level. Since A group contains only one center, it was again impossible to compare the difference between A and B groups. It is evident from the map (figure 7b), however, that there is a great deal of difference (approximately 650,000 s.f.), between even the largest center in the community group (256,097 s.f.) and the regional center (907,415 s.f.).

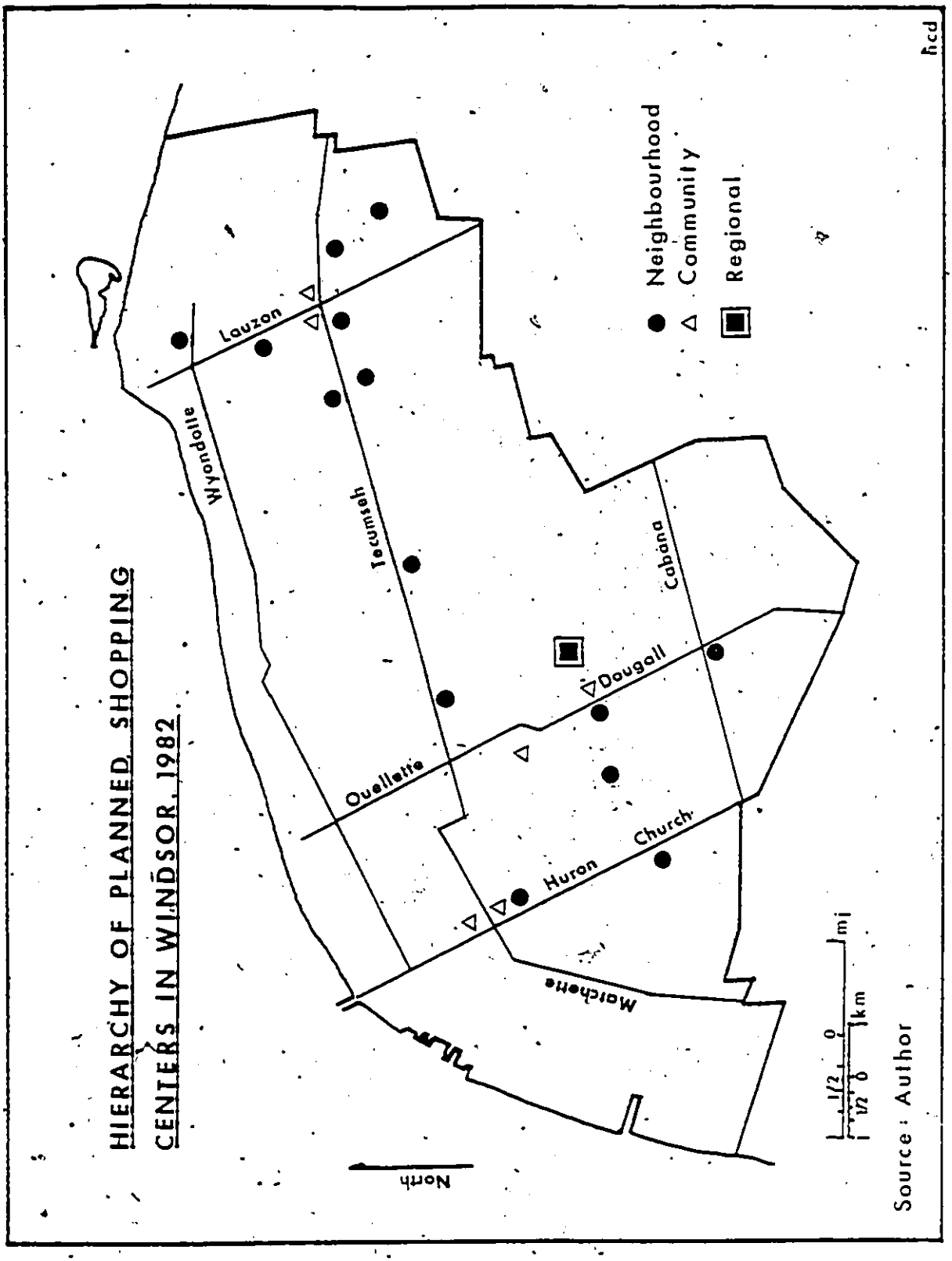
A comparison was then made (using groups A, B and C from the scatter diagram), with the Classification Code System and they were found to fit exactly into the regional, community and neighbourhood levels respectively. Since there are only average gross floor area data available in the code system, the difference between the mean of two groups was calculated and the maximum and the minimum range of floor area was de-

termined. The range of floor area of neighbourhood centers was 95,000 s.f. and below and that of community centers was 95,000 s.f. to 275,000 s.f. Regional centers measure above 275,00 s.f. and only Devonshire Mall falls into this grouping. Tecumseh, Dorwin, Eastown, Gateway, University and Ambassador centers fall into the community group with the remainder of the centers falling into the neighbourhood classification. The results of the test indicate that the same classifications exist under the gross floor area as did under the population served test.

A third testing system, using the average minimum site area data, was also plotted on the scatter diagram form and again three distinct groups were identified. Figure 7c shows the relationships between the site area and the number of establishments ($r = 0.89$) and again group A center differs from B group and figure 7c shows the distance between them. The mean site area for B group (17.7 acres) was compared with C group mean (2.36 acres), and it was found that the differences were significant at 99.9% probability level.

Again on the scatter diagram, groups were compared with the classification code. Since the average site areas for the regional, community and neighbourhood centers were forty, ten and four acres respectively, the maximum and minimum ranges of these groups were caculated as thirty and over, thirty to seven and seven and under. Once again, Devonshire Mall falls into the regional group with sixty-eight acres. Tecumseh, Dorwin, Eastown, Gateway, University and Ambassador centers come under the community grouping with the range of twenty-eight to eleven point four acre site areas. The rest of the centers fall into the neighbourhood group.

Figure 7 (d)


HIERARCHY OF PLANNED SHOPPING CENTERS IN WINDSOR, 1982
Neighbourhood
Community
Regional
Lauzon
Wyandotte
Tecumseh
Cabana
Dougall
Ouellette
Huron
Church
Matchette
North
1/2 0 1/2 0 mi km
Source: Author
hcd

It was confirmed, according to the major tenant criteria, that there are three distinct groups existing among the shopping centers in Windsor. Devonshire, with three major department stores, again stands apart from all the other centers. Dorwin, Eastown, Gateway, University and Ambassador centers each has one department store as its major tenant, Tecumseh Mall has two, while the rest of the centers have either a supermarket or convenience store (such as a Mac's Milk), or a drug store as an anchor tenant with the exception of Huron Plaza. By anchor tenant, the shopping centers are broken down into regional, community and neighbourhood levels and this break-down also agrees with the classification code criteria.

It can be concluded with the help of the table (2), the matrix and the scatter diagram (figures 7a, 7b and 7c), that there are three distinct groups of planned centers existing in the City of Windsor with Devonshire Mall in the category of regional center, Tecumseh, Dorwin, Eastown, Gateway, University and Ambassador centers in the community group and all the rest in the neighbourhood center group. Figure 7d illustrates the hierarchy of Planned Shopping Centers in the City of Windsor. It was also apparent that among the community and neighbourhood groups, distinctive sub-groups also exist (see figures 7a and 7b). According to population and floor space size, Dorwin and Tecumseh centers form a separate shopping center type which might be identified as Large Community Center. However, in this study, little attention will be given to sub-groups as such.

4.2

In the following section an analysis will be made of the characteristics of trade areas and those of functional units.

4.2.1 TRADE AREA SIZE

Several studies have proven that the size of the trade area varies in accordance with the size of the shopping center, (Nelson, 1958; LaLonde, 1962; Berry, 1963; Applebaum, 1968). Using this hypothesis, an analysis will be made to show how the size and the shape of the trade areas of the shopping centers of the City of Windsor will differ according to the shopping center levels.

If the sizes of the trade areas are first examined, figure 8a illustrates the relationships between the trade areas and the shopping center sizes. Here the population size was used as an analogue to shopping center size and from the scatter diagram, as well as from the correlation coefficient ($r = 0.99$), it is evident that when the shopping center size increases, the trade area size also increases. There is a large variation between the regional center size (32 s.m.) and the mean community center size ($\bar{x} = 6.2$ s.m.). Since Tecumseh Mall is the second largest shopping center with two major department stores, its trade area size is slightly larger than those of the other community centers. Dorwin and Eastown Plazas have roughly the same trade area size and even though the latter was identified as a small community center according to the number of establishments and population data, its trade area size is equivalent to that of Dorwin Plaza because of the Woolco Department store and the N & D Supermarket. This illustrates Applebaum's claim that

Table (4)

RELATIONSHIP BETWEEN TRADE AREA SIZES AND SHOPPING CENTER SIZES

		Floor Area (S/F)	Population	Trade Area (S/M)
1.	Devonshire	907415	159250	32.4
2.	Tecumseh	256097	56050	8.75
3.	Dorwin	209836	45200	7.53
4.	EastTown	195483	50450	7.40
5.	Gateway	187700	24250	4.45
6.	University	147885	39700	4.80
7.	Ambassador	142300	33150	4.50
				$\bar{x}$ 6.20
8.	Yorktown	78733	16650	2.8
9.	Central	69552	17000	3.4
10.	Forest Glade	69445	9250	.77
11.	Pickwick Place	57169	12800	1.30
12.	Village Market	40222	8200	.77
13.	Jefferson	24165	6300	.76
14.	Huron	20776	7500	.91
15.	Gladeview	16564	3800	.44
16.	Dougall/Cabana	15230	8302	1.90
17.	Lambton	15030	1200	.42
18.	Hampton	14767	7350	1.20
19.	Lauzon	14241	7600	.93
20.	EastGate	13630	11300	1.50
21.	Tecumseh/Howard	9345	4200	.55
				$\bar{x}$ 1.30

Source: City of Windsor Planning Office
Field Work

Figure 8 (a)

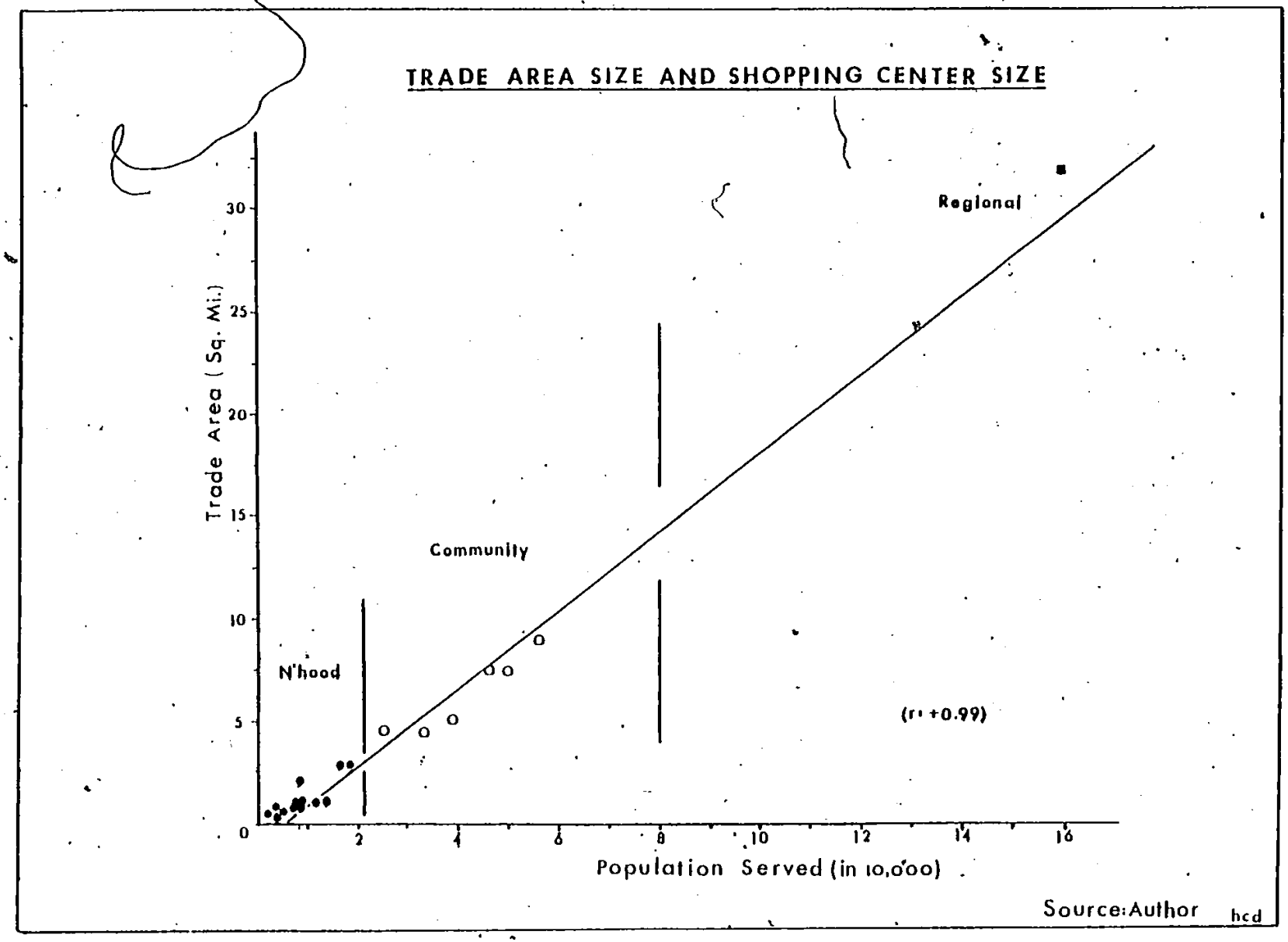
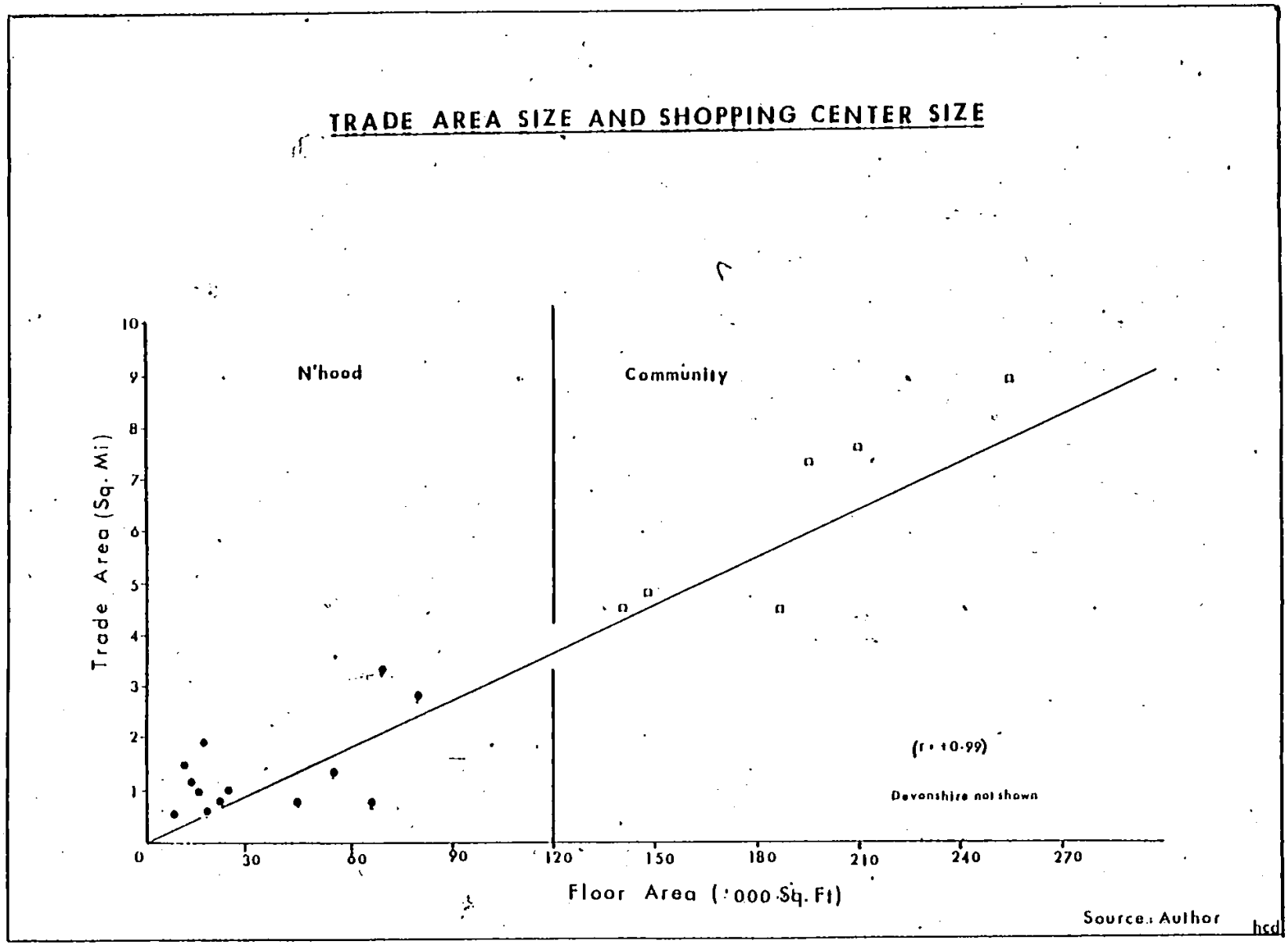

TRADE AREA SIZE AND SHOPPING CENTER SIZE
Trade Area (Sq. Mi.)
Population Served (in 10,000)
Regional
Community
N'hood
(r = +0.99)
0
5
10
15
20
25
30
2
4
6
8
10
12
14
16
Source: Author
hcd

Figure 8 (b)


TRADE AREA SIZE AND SHOPPING CENTER SIZE
N'hood
Community
Trade Area (Sq. Mi)
Floor Area ('000 Sq. Ft)
(r = 0·99)
Devonshire not shown
Source: Author
hsd

the major tenant of the shopping center reflects the shopping center's trade area (Applebaum, 1968). Eastown's location, in close proximity to the Tecumseh Mall, creates compatibility with it. That is, there is a certain amount of "borrowing" or "trading" of customers between the two centers. With trade area sizes averaging 4.6 s.m., Gateway Plaza, Ambassador Plaza and University Mall remain in the small community center category.

Central Mall with an A & P Supermarket and Yorktown Plaza with an N & D Supermarket are slightly separated in size from the other neighbourhood centers, with areas of 3.4 and 2.8 s.m. respectively. However, Forest Glade Plaza and Village Market Plaza are two exceptions to this criterion. Both have supermarkets (Gordon's and I. G. A.), but the high population density immediately surrounding these centers limits the spread effect of their trade areas. Compared with other neighbourhood centers, Pickwick Place and the Dougall/Cabana Plazas also have larger trade areas because of the variety of shopping goods. Eastgate Plaza has a Valdi discount grocery store which makes its trade area larger at 1.5 s.m., while the remainder of the neighbourhood centers measured just below 1 s.m., with the average being .8 s.m. The scatter diagram (figure 8a), indicates that all these centers are clustered together in size.

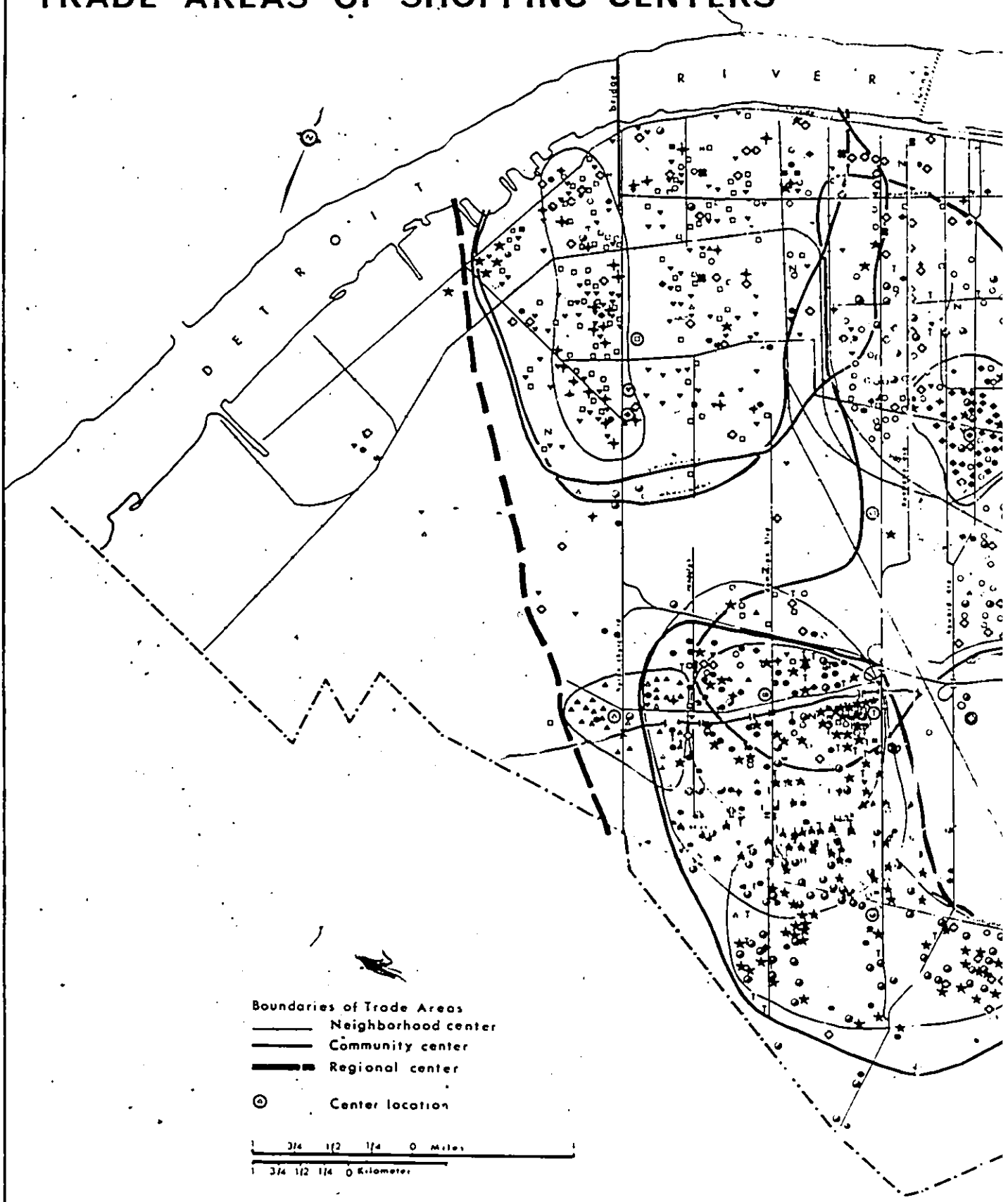
It is obvious from the scatter diagram (figure 8a) and table 4, that there is a rather wide differentiation between the size of the regional center and the sizes of the community centers. It was also found through the two sample "t" tests that the mean trade area size of the community centers differs significantly at 6.2 s.m. from the mean trade area size of neighbourhood centers (1.3 s.m.) (at 0.05 significant level). The

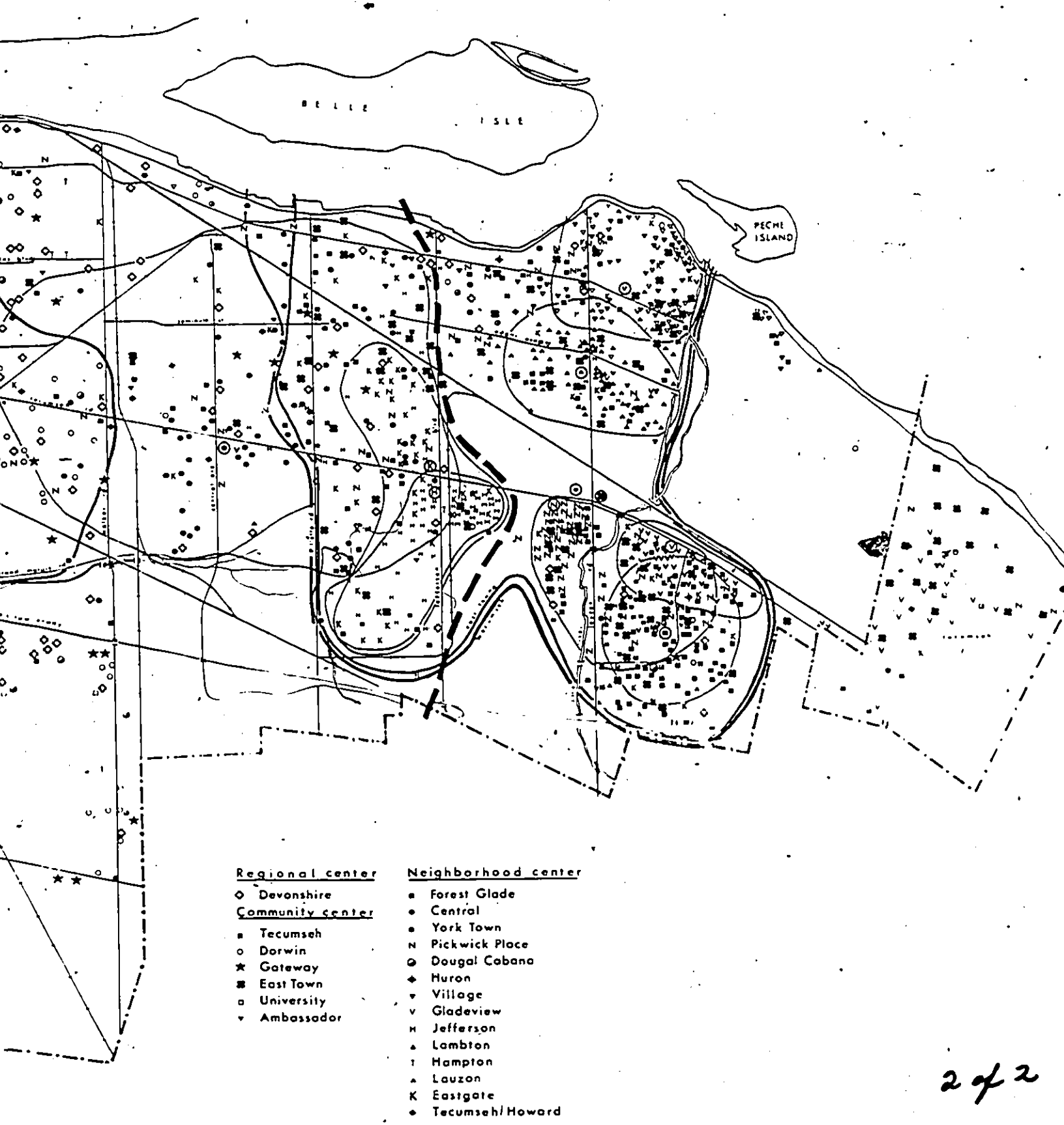
steep regression line indicates that there is a significance relationship between the centers' sizes and the trade area sizes. The correlation coefficient (r = 0.99) was tested with the "t" test and it was found that the relationship is highly significant at a 99.9% probability level, therefore the first hypotheses "Higher order shopping centers have larger trade areas than centers at lower level in the hierarchy in Windsor", is accepted.

In addition to population size, floor area (sf) (fig. 8b), was also used to test the hypothesis and to ascertain whether there is any relationship between the center size and the trade area size. It was proven that the relationship (r = 0.99) is significant at the 99.9% probability level.

Along with the foregoing, trade area shapes were also studied and different kinds of shapes were discovered at different levels. Firstly, upon examination of figure 8c, it is obvious that the Forest Glada Plaza trade area is an almost perfect circular shape. This phenomenon is mainly due to the cultural characteristics of that area. The city limits to the south and the east, the E.C. Row Expressway to the south, Tecumseh Road to the north and uninhabited industrial property to the west and north have created barriers to the ectension of the trade area (fig. 9). Tecumseh Mall and Pickwick Place trade areas heavily overlap the Forest Glade trade area within a half mile of that center. Since Forest Glade Plaza is located in a fairly recently developed community which is generally circular in shape, the overall layout of that community has also helped to create a circular type of trade area.

TRADE AREAS OF SHOPPING CENTERS





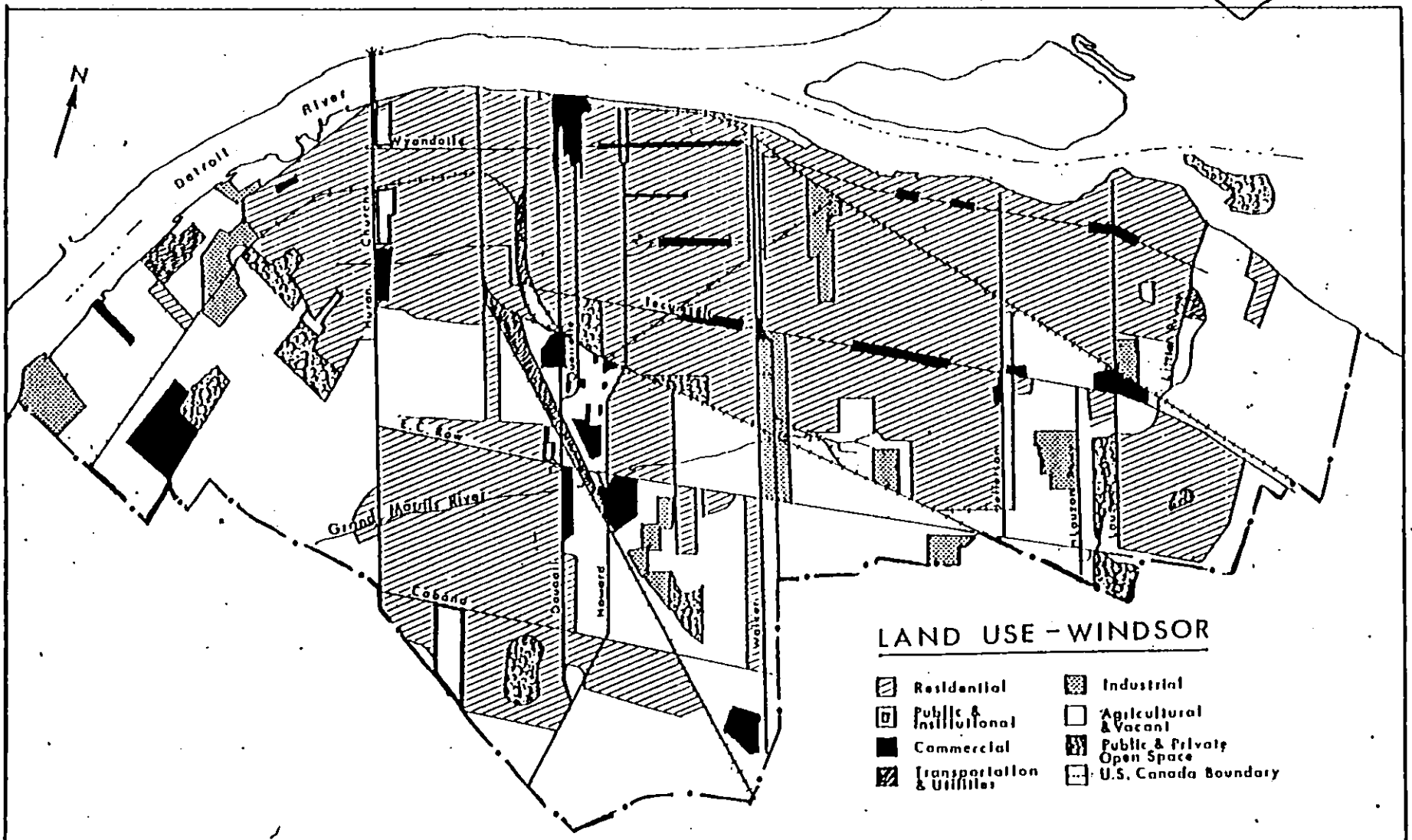
Regional center
◇ Devonshire

Community center
▪ Tecumseh
o Dorwin
★ Gateway
▪ East Town
▫ University
▾ Ambassador

Neighborhood center
▪ Forest Glade
• Central
▪ York Town
N Pickwick Place
⊙ Dougal Cabana
◆ Huron
▾ Village
v Gladeview
H Jefferson
▲ Lambton
T Hampton
▲ Lauzon
K Eastgate
◆ Tecumseh/Howard

2 of 2

Figure 9



Source: City Planning Department, 1981

hcd

Glade View Plaza, just northeast of Forest Glade Plaza, draws customers from the Forest Glade community through its Pinto convenience store as well as its Farmer Jack's fresh produce market. Since it is located at Tecumseh Road, it draws customers from the northern section, and its trade area has tended to develop in a "linear" manner along Tecumseh Road.

Pickwick Place Plaza, which is located to the northwest of Forest Glade, is separated from it by the Little River and Lauzon Road. Most of its daily customers patronize its drug store and come from the apartments to the east and from Sycamore and Meadowbrook Streets which are directly behind it to the south. However, since this Plaza is compatible with two nearby major centers, (Tecumseh Mall and Eastown Plaza), customers are also drawn from farther away. The trade area has tended to develop in an oval or "egg" shape because of an arm into Forest Glade, vacant land to the north and west and the competition of Tecumseh Mall and Eastown Plaza north of Tecumseh Road.

Further north, Village Market and Lauzon Plaza serve the population of the adjoining Riverside region. The Detroit River forms the northern trade area boundary for Village Market whose trade area shape is more circular than that of Lauzon Plaza, while Little River creates the eastern boundary for both centers. Most of the Villages of Riverside residents are served by Lauzon Plaza and since there is vacant land in both the south and the southeast, its trade area has also tended to develop ovately.

Jefferson Plaza with its Mac's Milk convenience store, meat market and health food store, serves its immediate environs - the Roseville and Thornberry Drive areas. Vacant land to the northeast, industry

to the southeast, the E.C. Row Expressway and the city limits in the south along with competition from Eastgate Plaza in the north, have caused a narrowing of the trade area between Pillette Road and Jefferson Avenue. A "linear" shape has been produced, with the same customers also patronising the Eastgate Plaza. Since Eastgate houses a Valdi's discount grocery store and more convenience-type stores, including Farmer Jack's produce, it also draws customers even from the north and a "V" shaped trade area has been formed which includes the Roseville Gardens area.

In the case of the Tecumseh/Howard Plaza, Mac's Milk convenience store and restaurants attract customers for its primary trade area, mostly from the MacDougal Avenue district and from south of the center between Tecumseh Road and the Essex Terminal and Canadian Pacific R.R. tracks. These, along with Jackson Park on the west, limit the trade area whose shape is ovoid.

On the city's west side, Huron Plaza, with restaurants and a lottery shop, draws customers along and west of Huron Church Road, its trade area has developed in a "linear" manner, but with severe competition from Ambassador Plaza and University Mall. Lambton Plaza is also located on Huron Church Road but further south and because of the large extent of vacant land in the northwest and the south, its variety store and bake shop draw customers from the limited housing development to the west and for a few blocks along Grand Marais Road. As a result, customer distribution has developed linearly along Grand Marais and Lambton Roads instead of Huron Church.

Yorktown Plaza, located at a major axis of Grand Marais Road and Dominion Boulevard, with an N & D Supermarket, a hardware, a bank and

other tenants, draws customers from the area between E.C. Row to the north and Cabana Road to the south. Its trade area extends as far as Huron Church Road in the west and Dougall Avenue in the east and its ovate shape includes most of the South Windsor district. Hampton/Rivard Plaza at Rivard Road also draws customers from the same area but on a smaller scale.

As in the case of Yorktown Plaza, Dougall Road serves as the eastern boundary line and E.C. Row the northern for the Dougall/Cabana Plaza. On the west and south sides, with Randolph Avenue and Beal Street bounding, the trade area tends to shape in a circular manner, developing and extending along Cabana Road, but since there is vacant land between Cabana Road and Wallace Avenue, this trade area is generally ovoid in shape.

Because of their anchor tenants, Community Centers such as Eastown Plaza, Tecumseh and University Malls and Ambassador Plaza all have similarly shaped trade areas. Eastown Plaza and Tecumseh Mall both attract numerous customers from Tecumseh Township and because of the large vacant area in the northeast and Little River in the west, their primary trade area (which they have in common), includes the entire Forest Glade community in the southeast. The north and south areas are bounded by the Detroit River and the city limits respectively, while a vacant land area along the Grand Marais Drain near Pillette Road as well as competition from Central and Devonshire Malls create a western and southwestern boundary. The general contour of the trade area is rectangular but an expanse of industrial land between Jefferson Avenue and Lauzon Road and vacant land in the northeast causes an irregularity in its outline.

Trade area boundaries are common to both the Ambassador Plaza and University Mall in the south, southeast and southwest. Their boundaries

are limited to the north because of school and park properties as well as by the Detroit River. To the east, the Canadian National Railway Trunkline cuts off the trade area of Ambassador Plaza whereas that of University Mall extends easterly as far as Dougall Road.

Although community centers such as the foregoing have relatively small, compact and almost uninterrupted trade areas, Dorwin Plaza shows a geographically expansive trade area spread over three distinct and separate residential areas. The northern section extends as far as Wyandotte Street along Dougall Road, narrowing down in the northwest because of the railroad tracks, but stretching out to Walker Road in the northeast. A fairly large number of shoppers is drawn from the northern part of South Windsor. The Sentry Department Store, Dominion Supermarket and a high number (29) of other establishments including beer and liquor outlets, have caused an extensive spread of the trade area. Also, being the first large Planned Shopping Center in Windsor, Dorwin Plaza's clientele was established early. It is located on a major access route in the center of a large commercial/light-industrial district with residential developments on the periphery. Its trade area shape therefore, is revealed as both a "linear" and a "cluster" pattern.

For Gateway Plaza, the E.C. Row Expressway and the city limits serve as the northern and southern trade area boundaries respectively. In the west it extends as far as Huron Church Road, being cut off in the east by Howard Avenue. Because of the competition from Devonshire Mall as well as the non-residential land-use pattern (such as light-manufacturing, industrial and vacant land), along with the residential development between Cabana Road and Howard Avenue, the trade area is, generally speaking, peariform in shape.

As is to be expected, Devonshire Mall, the only regional center, serves the entire city. Its primary trade area is interrupted in the northeast by the Lauzon Parkway Industrial Site and in the west it extends as far as the major vacant land - that is along Huron Church Road in the southwest and the area west of Prince Road in the northwest. The Detroit River and the city limits are respectively the northern and southern boundaries of the more concentrated shopper distribution of this shopping center. It is noted that Devonshire Shopping Center attracts many customers who are dispersed as far east as the town of Leamington.

In addition to the descriptions of the visual shapes of trade areas, these were measured in ratios. The basic parameters used were trade areas and the length of the longest axis, the ratios as produced are shown in table 5. According to this table, all the neighbourhood centers vary between 0.0 and 1.0 or less with a closeness to 0.0 indicating an elongation while a circle would be shown as having a ratio of 1.0. By comparing figure 8c and 8d and table 5, it is obvious that the trade areas of Gladeview (0.5), Jefferson (0.6), Lambton (o.3) and Huron (0.5) shopping centers can all be described as being "linear". Forest Glade's ratio of 1.0 indicates a circular trade area as do those of Yorktown (1.1), Hampton/Rivard (1.2), Village Market (0.9) and Dougall/Cabana (1.1), all of which are reasonably close to being circular in shape.

It is interesting to note that for all community centers and the regional center, the ratios are far beyond 1.0 due to there being more complexity and irregularity of shapes. Consequently, the Boyce-Clark Shape Index was used to ascertain the exact shapes of these trade areas. In a series of experiments it was found that the index for a square is approximately 12.0, a cruciform's index is around 18.0, a star-shaped

Table (5)

DESCRIPTION OF "SHAPES"

		+	*
1.	Devonshire	5.4	22.0
2.	Dorwin	2.4	25.7
3.	Tecumseh	1.8	24.0
4.	Easttown	1.8	23.8
5.	University	1.8	21.5
6.	Ambassador	1.7	35.3
7.	Gateway	1.6	32.6
8.	Yorktwon	1.1	
9.	Lauzon	0.8	
10.	Village Market	0.9	
11.	Forest Glade	1.0	
12.	Huron	0.5	
13.	Tecumseh/Howard	0.7	
14.	Lambton	0.3	
15.	Hampton	1.2	
16.	Dougall/Cabana	1.1	
17.	Gladeview	0.5	
18.	Jefferson	0.6	
19.	Eastgate	0.8	
20.	Pickwick Place	0.8	
21.	Central	1.6	

Source: Author

* = Boyce Clark Method

+ = Peter Hagget Method

Figure 8 (d)

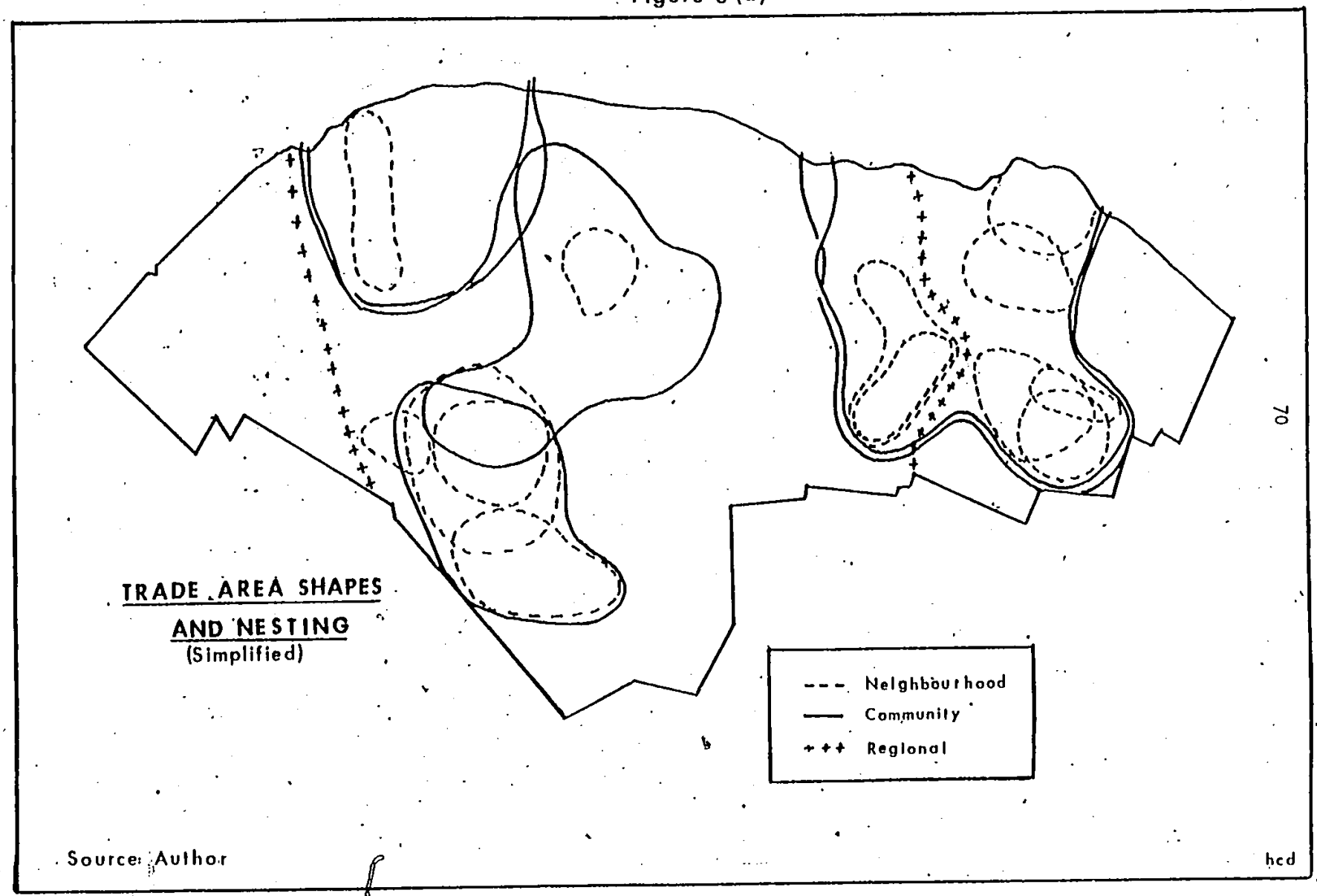
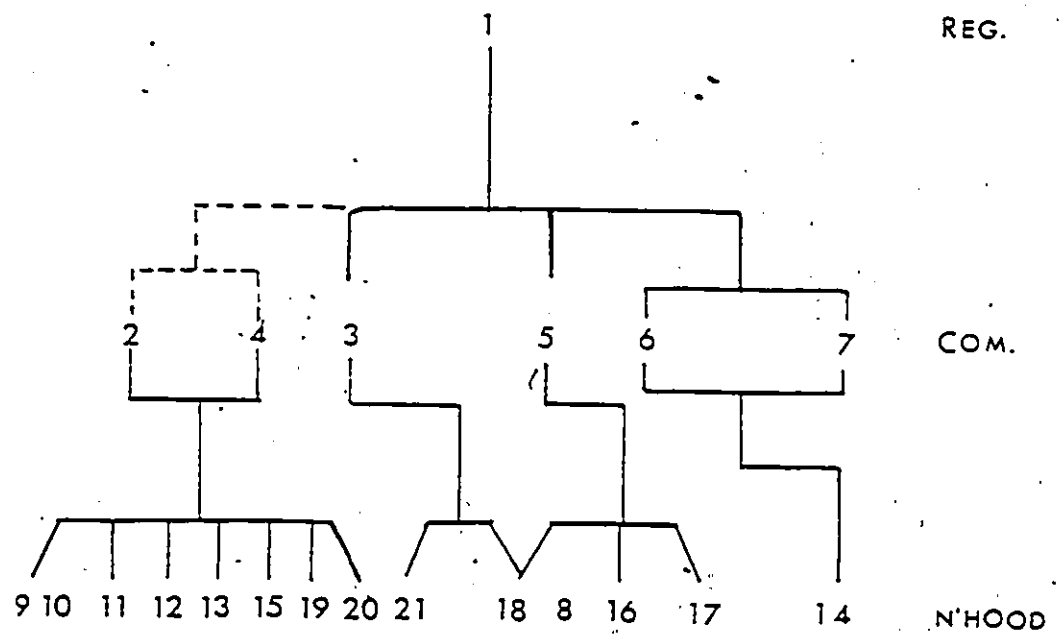

TRADE AREA SHAPES
AND NESTING
(Simplified)
Neighbourhood
Community
Regional
Source: Author
hcd
70

Figure 8(e)

NESTING OF TRADE AREAS

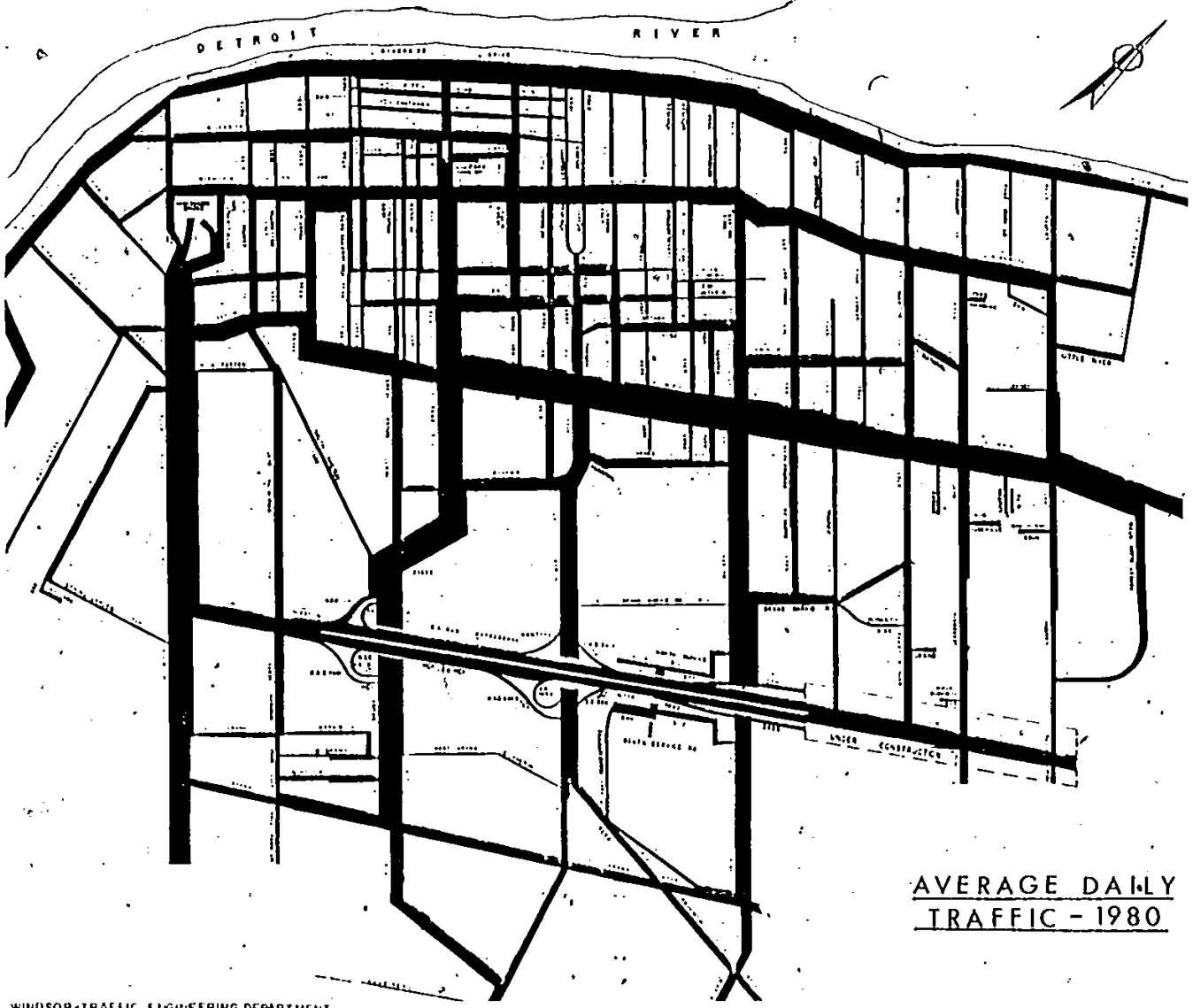


---- Partly Nested

(1) = Refer to Center ID Number - Table 1

Source: Author

Figure 10



AVERAGE DAILY
TRAFFIC - 1980

SOURCE: WINDSOR-TRAFFIC ENGINEERING DEPARTMENT

(or stellate) form approximates 25.0 and a rectangle, being twice as long as it is wide, measures about 28.0 (Boyce-Clark, 1965). According to table 5, Tecumseh Mall and Eastown Plaza with their physical features and industrial land each produce a ratio of approximately 24.0 which is indicative of the stellate formed trade area. The ratios of Dorwin Plaza, Devonshire and University Malls and Ambassador Plaza all lie between 22.- and 26.0 connoting that their trade areas are somewhere between cruciform (18.0) and stellate (25.0) in shape; while that of Gateway Plaza whose ratio is 35.0, tends toward being rectangular.

Finally, it is of further interest to see from the diagrams that to a certain extent, a nesting of trade areas exists (figure 8d and 8e). Forest Glade and Gladeview Plazas tend toward a nesting with Pickwick Place Plaza, which is larger in overall size and has more shopping goods. Hampton/Rivard and Lambton Plazas are also examples of this phenomenon, nesting into Yorktown Plaza's trade area, the latter having a large supermarket and shopping goods. The nesting is explained by the trade areas of the larger neighbourhood centers covering those of smaller ones. The main reason for this is that those of larger size house supermarkets and/or a variety of business type establishments. As well, the centers have been located too closely together and an overlapping of goods and services has resulted.

It can also be seen that all of the neighbourhood centers are nested into one or another of the community centers. Eastgate, Jefferson, Lauzon, Village Market, Pickwick Place, Forest Glade and Gladeview all being influenced by the two major community centers, Tecumseh Mall and Eastown Plaza. In a like manner, Gateway Plaza's trade area includes all the small centers in the South Windsor area - namely Hampton/Rivard,

Yorktown, Dougall/Cabana and Lambton Plazas. Huron Plaza is covered by University Mall and Ambassador Plaza while Dorwin Plaza covers the trade area of Tecumseh/Howard Plaza. Finally, with the exception of the centers in Riverside and Forest Glade, the regional center, Devonshire Mall directly influences all the others. Figure 8e shows this nesting of trade areas in diagrammatic form. It might therefore be concluded that even though a hexagonal type of hierarchical nesting does not occur, hierarchical nesting does in fact exist to a certain degree or level among the shopping centers of the City of Windsor.

4.2.2 TRADE AREA POPULATION

As residential densities decrease within an urban area, shopping centers should be more widely spaced and their minimum size should increase. Population density generally declines with distance from the central business district (Berry et al., 1963), so the largest number of separate establishments and small nucleations within a metropolis should be found in the inner residential zones. Larger centers will also occur but will be relatively less numerous than in the outer suburbs where the smaller centers cannot survive.

Figure 11 (the cumulative percentage of population within trade areas by ½ mile zones), shows that more than 75% of the trade area population lives within the first one mile zone of the neighbouthood centers which indicates that most of these centers are located in high density residential areas. However, with regard to the community centers' population, only about 35% (or just under half that of a neighbourhood center's trade area population), lives within the first one mile radius, whereas within the same mile radius, a regional center would merely show

Table (6a)

CUMULATIVE POPULATION OF TRADE AREAS BY ½MILE ZONES

		0-½	½-1	1-1½	1½-2	2-2½	2½-3	3-3½	3½-4	4-4½
1.	Devonshire	0.18	3.60	12.08	25.65	36.95	52.55	76.45	95.20	100.00
2.	Tecumseh	3.35	25.41	59.10	86.64	97.76	100.00			
3.	Dorwin	.82	26.60	62.70	96.50	100.00				
4.	EastTown	4.35	24.95	50.64	86.00	99.50	100.00			
5.	University	11.80	49.81	82.55	100.00					
6.	Ambassador	10.60	42.40	81.50	100.00					
7.	Gateway	9.46	39.96	83.76	100.00					
8.	Yorktown	32.90	83.20	100.00						
9.	Forest Glade	100.00								
10.	Central	24.10	66.20	100.00						
11.	Pickwick Place	18.10	60.77	95.30	100.00					
12.	Dougall/Cabana	27.60	95.10	100.00						
13.	Hampton	50.50	100.00							
14.	Huron	20.30	54.20	91.50	100.00					
15.	VillageMarket	80.90	100.00							
16.	Gladeview	92.90	100.00							
17.	Lauzon	78.20	100.00							
18.	EastGate	45.40	87.40	100.00						
19.	TecumsehHoward	100.00								
20.	Lambton	100.00								
21.	Jefferson	39.70	92.10	100.00						
Neighbourhood		57.90	76.90	98.10	100.00					
Community		6.73	34.80	70.00	94.80	99.00	100.00			
Regional		00.18	3.60	12.08	25.65	36.95	52.55	76.45	95.20	100.00

Source: Assessment Office Statistics
Field Work

Table (6b)

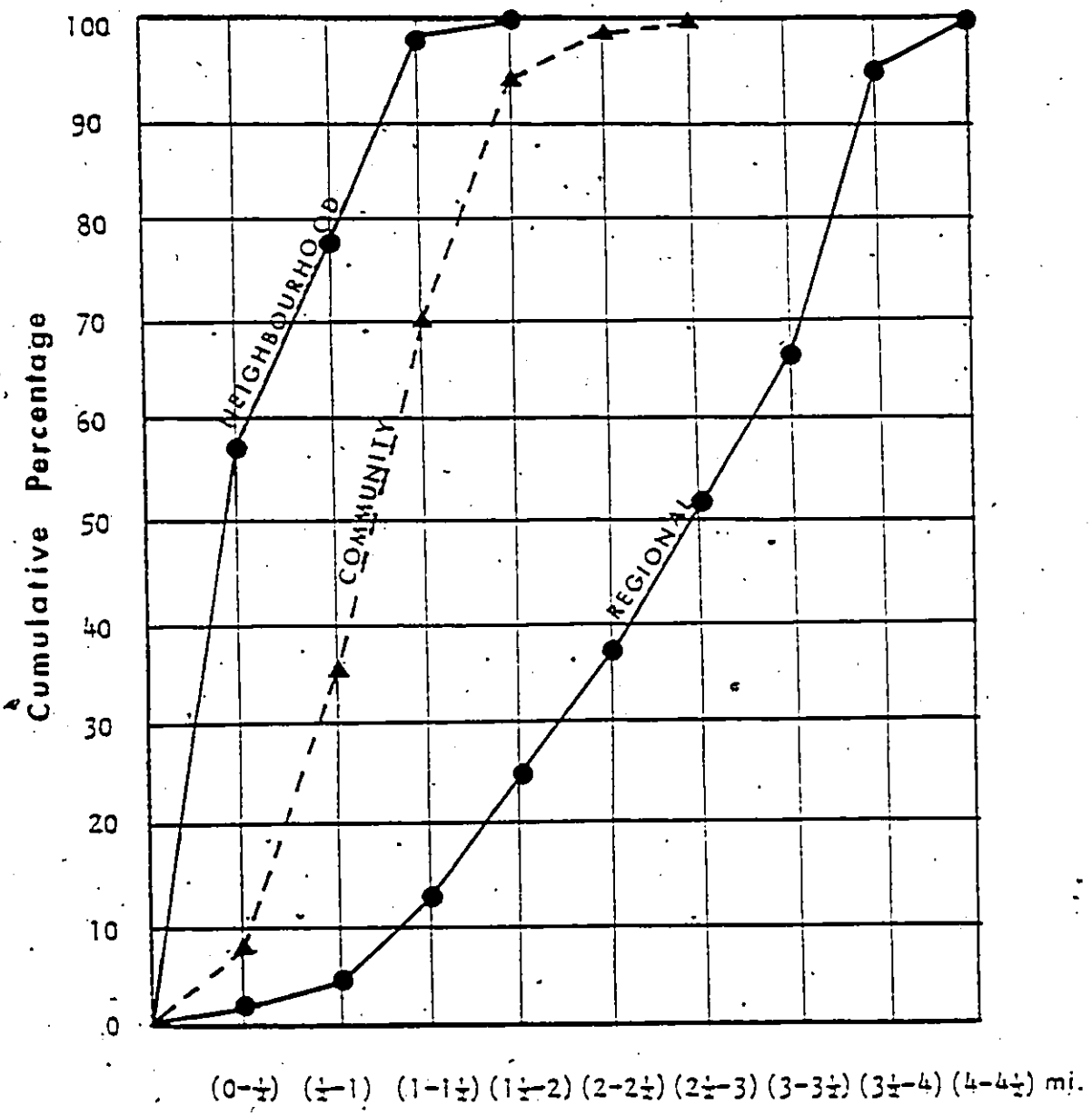
TRADE AREA POPULATION BY ½MILE ZONES

		0-½	½-1	1-1½	1½-2	2-2½	2½-3	3-3½	3½-4	4-4½
1.	Devonshire	0.18	3.42	8.48	13.57	11.30	15.60	23.90	18.75	4.78
2.	Tecumseh	3.35	22.06	33.70	27.53	11.12	2.20			
3.	Dorwin	.82	25.79	36.1	33.79	3.40				
4.	EastTown	4.35	20.60	25.69	35.36	13.50	0.44			
5.	University	11.80	38.01	32.75	12.30					
6.	Ambassador	10.60	31.80	39.10	18.50					
7.	Gateway	9.46	30.50	43.80	16.20					
8.	Yorktown	32.90	50.30	16.76						
9.	Forest Glade	100.00								
10.	Central	24.10	42.10	33.80						
11.	Pickwick Place	18.10	42.67	34.50	5.00					
12.	Dougall/Cabana	27.60	67.50	4.90						
13.	Hampton	50.50	49.40							
14.	Huron	20.30	33.90	37.30	8.50					
15.	Lauzon	78.20	21.80							
16.	Village Market	80.90	19.10							
17.	Gladeview	92.90	7.10							
18.	EastGate	45.40	42.00	12.6						
19.	Tecumseh/Howard	100.00								
20.	Lambton	100.00								
21.	Jefferson	39.70	52.40	7.90						
	Neighbourhood	57.90	30.59	10.55	.96					
	Community	6.73	28.10	35.20	24.77	4.67	.44			
	Regional	.18	3.42	8.48	13.57	11.30	15.60	23.90	18.76	4.78

Source: Assessment Office Statistics
Field Work

Figure 11

POPULATION WITHIN TRADE AREAS BY LEVEL OF SHOPPING CENTER



Source: Author

about 4% of its total trade area population. The distribution of population for three types of centers in the hierarchy are clearly very different. This well illustrates the effect of differing "ranges" of central place functions upon their distribution patterns. The second hypothesis, that trade area population density within one mile for small centers is higher than that of the next order shopping centers, is therefore accepted.

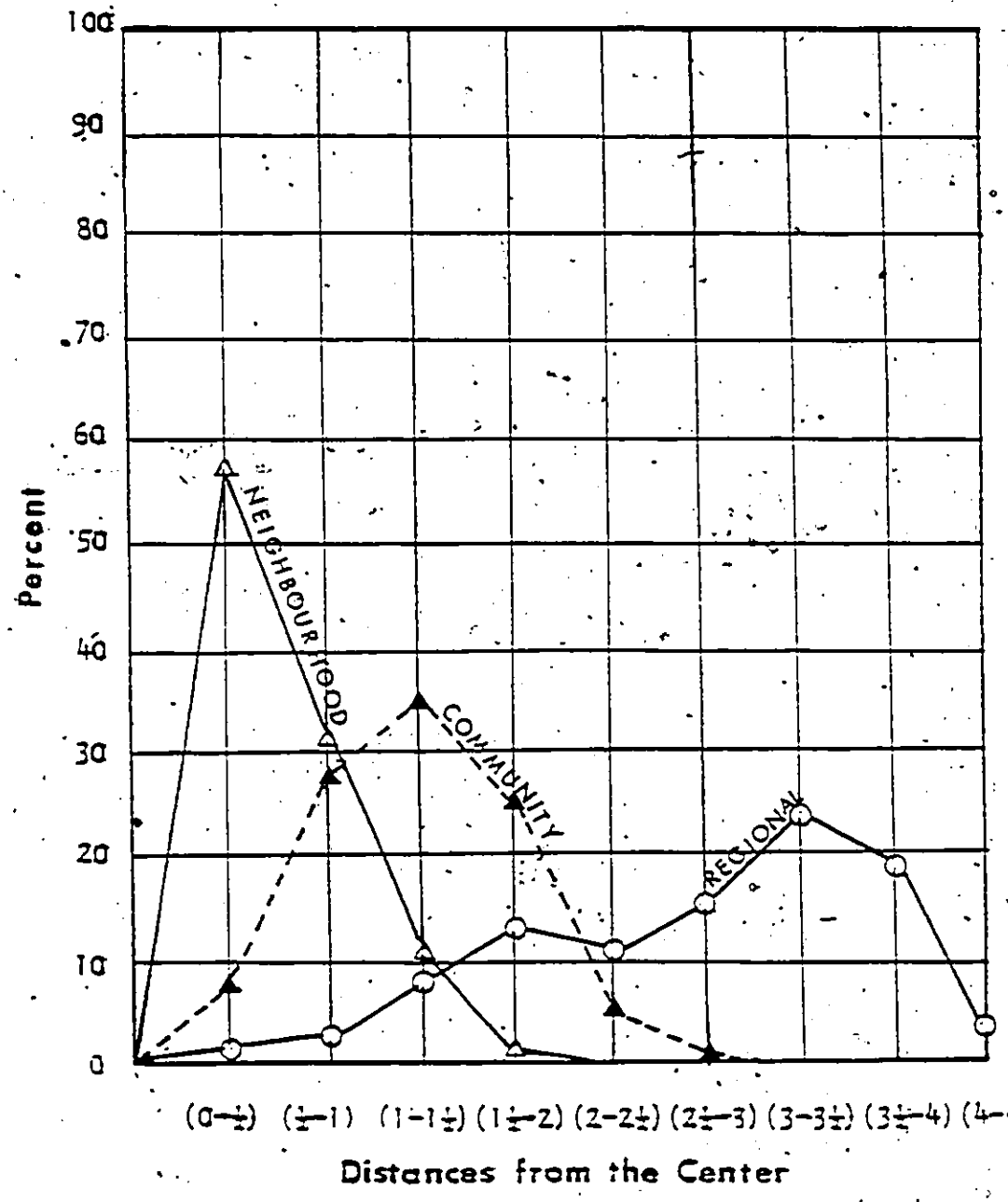
Figure 12 (percentage of population within trade areas by ½ mile zones), illustrates that the highest percentage (57%) of the trade area population for neighbourhood centers lives within the first half mile zone, whereas the highest percentage of the population (35.2%) lives within 1 - 1½ mile zone of community centers. For a regional, a 3 - 3½ mile radius from the shopping center is indicated. While neighbourhood and community centers' trade area population density shows a sudden increase or decline, the density of a regional center's trade area experiences a very gradual increase or decline.

The reason for less (4%) population density for Windsor's regional center within the first one mile radius is that it was constructed south of where the E.C. Row Expressway with its fly-overs and ramps is now located, near the suburban area to enable customers to be drawn from all over the city as well as for cheap land. This is a graphic illustration of Berry's (1962) Accessibility and Outlying Business Centers Model (see figure 2, above). Furthermore, there is railroad property and commercial land (which includes Gateway Plaza), on the west side of this center (see figure 9, land use map), and a huge plot of vacant land to the south. Immediately to the east of Devonshire Shopping Center, is a large industrial park and farther east and southeast there are scattered indus-

Figure 12

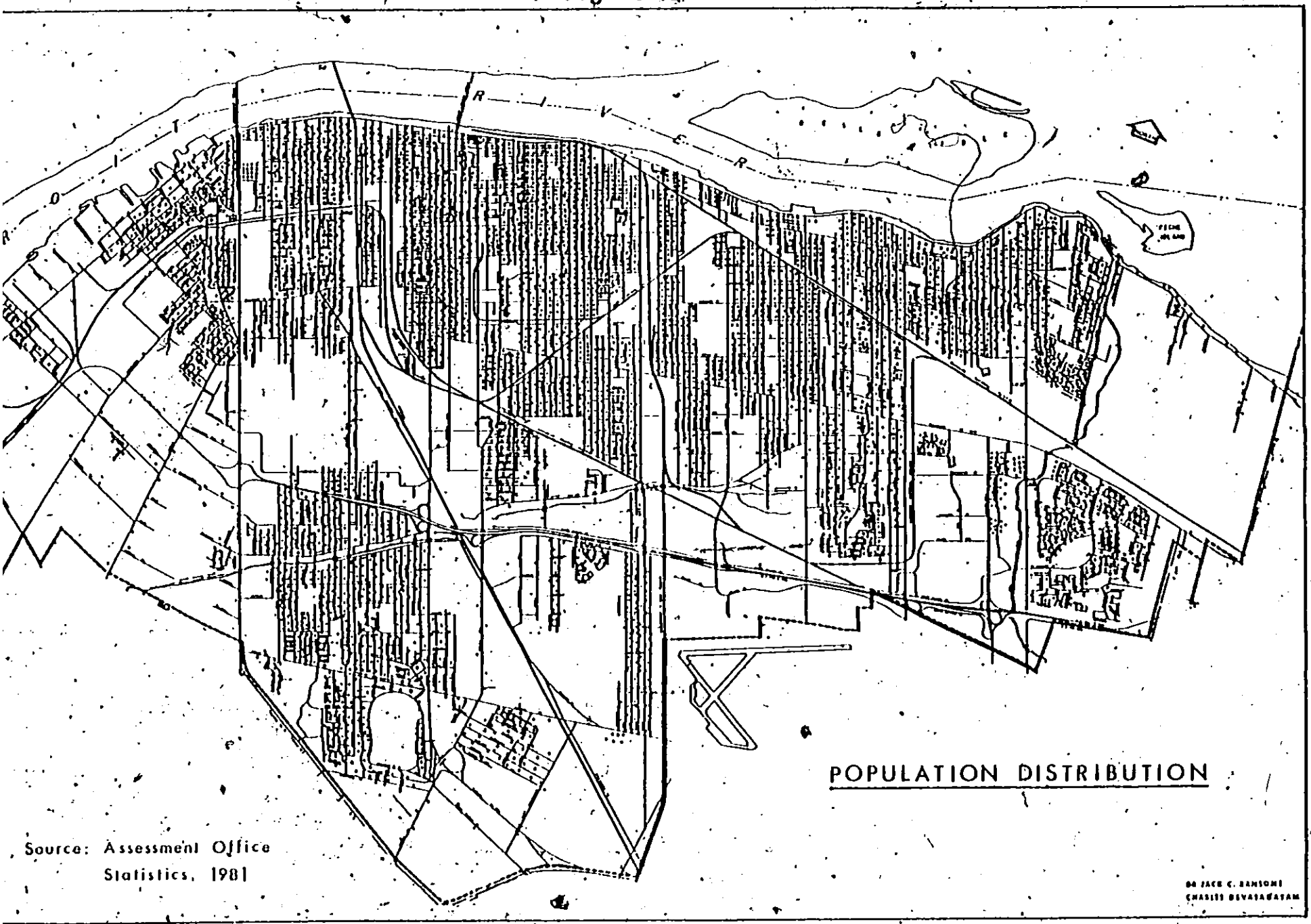
PERCENTAGE OF POPULATION WITHIN TRADE AREAS

BY LEVEL OF SHOPPING CENTER



Source: Author

Figure 13



Source: Assessment Office
Statistics, 1981

trial lots and open spaces or park areas as well as vacant lands. After the first mile radius, the density increases because of the South Windsor residential district in the southeast and an additional residential area between the E.C. Row Expressway and Cabana Road along Walker Road, unlike the characteristics of the other two types of centers. However, there is a decrease in the 2 - 2½ mile radius because the trade area extends beyond the city limits in the south and more vacant land occurs both east and west. The density increases after 2½ miles because it covers the major residential areas to the north of the center.

Figure 11 gives evidence of the density gap between the regional center and the community centers being very wide but that it narrows between community and neighbourhood centers. In fact, the gap shows a shrinking immediately beyond the 1½ mile radius, no doubt because some of the neighbourhood centers did not locate in proper residential areas. Their trade area limits extend as far as 1½ miles due to the major supermarkets and shopping goods stores. For instance, Pickwick Place's immediate trade area population is separated by the physical barrier of Little River and since it extends up to 1½ miles in the Forest Glade area, the percentage of density is high in that 1½ mile radius. The same thing is true in the case of Central Mall. Its trade area narrows around the shopping center as does Pickwick's, and expands northward between Central and Jefferson Avenues as far as the C. N. R. track. Yorktown Plaza also has a large trade area (being bounded by the E.C. Row in the north), its trade area population density increases southward in the residential district. Huron, Eastgate and Jefferson Plazas' linear type trade areas produce the same results with the gap declining in the 1½ mile radius. However, there is a distinct difference between the three groups' population densities by distances from the centers, so it can be concluded that central place

characteristics do exist by means of population density and distance from the center.

4.2.3 CUSTOMER LOCATION OR DISTANCES TRAVELLED

Although it seems plausible to expect that a center's immediate vicinity should provide the majority of its customers, especially those of neighbourhood shopping centers, it is not always true. Population density, land use characteristics (physical barriers), transportation networks, types of goods offered or combinations of these can have a strong influence on the customer location or distances travelled.

Figure 14a (the cumulative percentage of customers in the hinterland by ½ mile zones), shows that within the first ½ mile zone, 39.4% of customers came to shop at neighbourhood centers whereas only 10.9% came to shop at community centers. No customers visited the regional center from within the same radius. The figure further shows that there is a steep increase in the percentage of customers for neighbourhood centers up to 1½ - 2 mile radius, 75% being from this radius while the same percentage of customers came to community centers from within a 2 - 2½ mile radius. In contrast, 75% of the customers came to the regional center from the 4½ - 5 mile radius, clearly indicating that there is a distinctive difference in distances travelled for different types of centers in the hierarchy.

Also detailed in figure 14b is the customer location within each half mile zone. This figure gives plain evidence that a higher percentage of the customers came to neighbouthood centers from within the first half mile zone and from between ½ and 1 miles to community centers whereas the highest percentage came to regional centers from within the 4 - 4½ mile

radius. The peaks illustrated in figure 14b can be regarded as critical zones of penetration. That is, for each type of center, experience says that a facility or complex must achieve a high proportion of customers in these peak areas or making sales budget will be difficult. Three dimensional Symvu Maps illustrate these central place characteristics through the samplings of three shopping centers selected from each of the three categories - Neighbourhood, Community and Regional. The three examples are: 1. Forest Glade Plaza - Neighbourhood Center, 2. University Mall - Community Center and 3. Devonshire Mall - Regional Center.

Figure 14c shows that the majority of Forest Glade's customers are clustered around the center. This is because of the type of the goods offered (mostly convenience goods and services, including the Gordon Supermarket), high population density (a high-rise apartment building adjacent to the center as well as the area being mainly a solid single family residential area), and the nature of the land use (bounded by Little River, the city limits, etc.). Moreover, most of the neighbourhood enters in the City of Windsor are located in or adjacent to highly residential areas, other good examples being Village Market, Lauzon, Yorktown and Jefferson Plazas, (see Population Map, figure 13). The high peaking of the customer distribution for neighbourhood centers is illustrated through figure 14c - Forest Glade Plaza.

Community centers tend to have more shopping goods such as general merchandise, furnityre and apparel than do neighbourhood centers, therefore the greater part of customer distribution is expected to be spread somewhat farther from the center. Figure 14d illustrates this situation in detail. University Mall, which indicates a smooth but somewhat narrow curve of customer distribution in contrast to the upside-down "V"

Table (7a)

CUSTOMER LOCATIONS IN CUMULATIVE PERCENTAGE

	0-½	½-1	1-1½	1½-2	2-2½	2½-3	3-3½	3½-4	4-4½	4½-5	5-+	%ge
1. Dev.	0	7	10.5	18.5	26.5	35	46.5	56.5	67.0	73.5	78.5	100.
2. Tec.	6.0	23.5	50.6	69.9	75.2	79.8	83.1	86.4	88.4	89.0	93.6	100.
3. Dor.	0.6	26.6	50.6	65.2	80.5	85.1	87.7	89.0	89.0	89.0	96.3	100.
4. E.T.	7.2	28.0	44.8	61.6	76.0	80.8	84.8	88.0	89.6	89.6	93.6	100.
5. Uni.	23.0	52.3	69.6	76.2	79.8	83.5	88.1	90.1	92.2	94.2	96.8	100.
6. Amb.	17.6	43.2	70.6	83.4	86.6	89.0	90.6	91.4	92.2	92.2	92.2	100.
7. Gwy.	11.4	34.2	50.7	64.4	72.4	74.7	77.0	84.4	85.5	85.5	87.8	100.
$\bar{X}$	10.9	34.6	56.2	70.1	78.3	82.2	85.2	88.2	89.0	89.9	93.4	100.
8. Y.T.	29.0	63.0	70.0	80.0	90.0	93.0	96.0	97.0	97.0	97.0	97.0	100.
9. F.G.	65.0	82.0	82.0	85.0	89.0	93.0	96.0	98.0	100.	100.	100.	100.
10. Cen.	18.0	32.0	61.0	74.0	75.0	80.0	83.0	86.0	90.0	92.0	93.0	100.
11. P.W.	29.0	40.0	56.0	67.0	72.0	76.0	79.0	81.0	82.0	83.0	90.0	100.
12. D/C	16.0	39.0	54.0	62.0	69.0	73.0	82.0	91.0	96.0	98.0	100.	100.
13. Ham.	26.6	47.9	62.5	60.5	75.8	82.4	83.7	85.0	86.3	86.3	86.3	100.
14. Hur.	12.0	29.3	38.6	53.2	57.2	59.8	59.8	59.8	59.8	63.8	66.4	100.
15. Lau.	62.5	85.0	90.0	95.0	96.3	97.6	98.9	99.2	99.2	99.2	99.2	100.
16. V.M.	68.0	87.0	93.0	96.0	97.0	97.0	100.	100.	100.	100.	100.	100.
17. G.V.	42.3	46.1	57.6	76.8	81.9	84.4	88.2	88.2	89.5	89.5	99.6	100.
18. E.G.	22.5	41.2	63.7	77.4	87.4	91.1	94.8	96.1	96.1	96.1	96.1	100.
19. T/H	53.2	57.1	66.1	76.4	79.0	79.0	80.3	81.6	81.6	87.6	82.9	100.
20. Lam.	59.6	68.3	73.5	77.6	78.7	78.7	78.7	78.7	78.7	78.7	78.7	100.
21. Jef.	47.5	68.8	85.0	92.5	93.8	93.8	95.1	96.4	96.4	99.0	100.	100.
$\bar{X}$	39.4	56.1	68.1	77.3	81.6	84.2	86.8	88.4	89.4	90.7	92.1	100.

Source: Questionnaire

Table (7b)

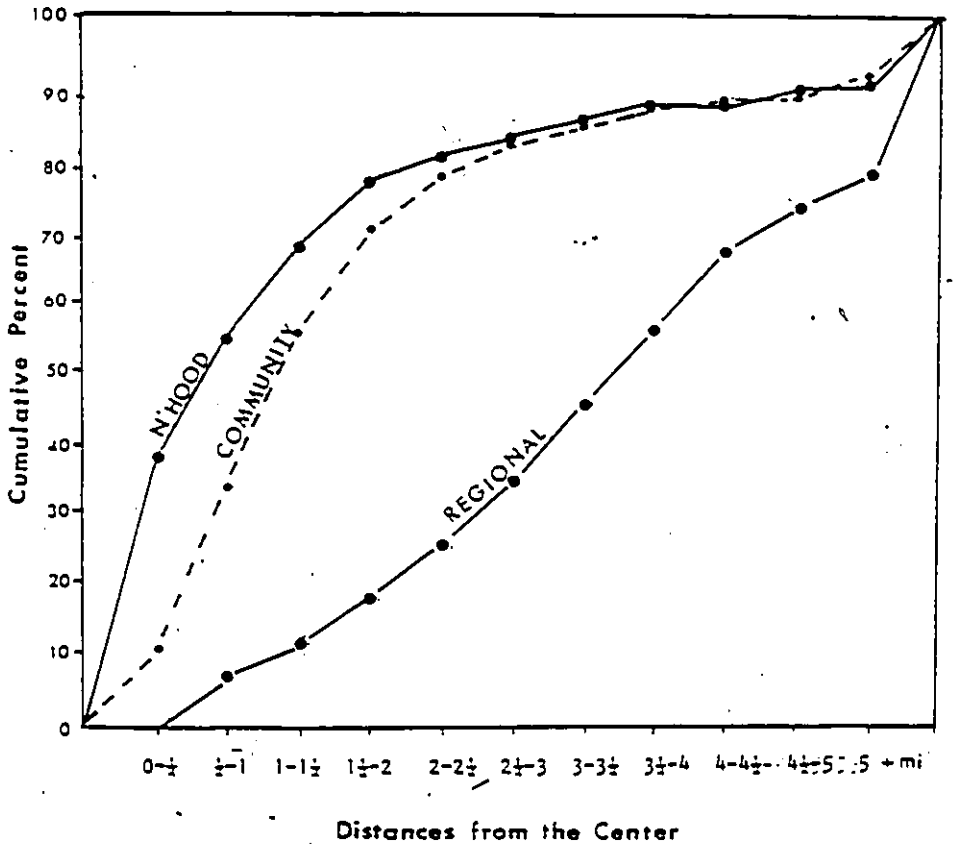
PERCENTAGE OF CUSTOMERS IN THE STUDY AREA

		0-½	½-1	1-1½	1½-2	2-2½	2½-3	3-3½	3½-4	4-4½	4½-5	5-+
1.	Dev.	- -	7.0	3.5	8.6	8.0	8.5	11.5	10.0	17.0	6.5	5.0
2.	Tec.	6.0	17.3	27.3	19.3	5.3	4.6	3.3	3.3	2.0	0.6	4.6
3.	Dor.	0.6	26.0	24.0	14.6	15.3	4.6	2.6	1.3	- -	- -	7.3
4.	E.T.	7.2	20.8	16.8	16.8	14.4	4.8	4.0	3.2	1.6	- -	4.0
5.	Uni.	23.0	29.3	17.3	6.6	3.5	4.0	4.6	2.6	2.0	2.0	2.6
6.	Amb.	17.6	25.6	27.4	12.8	3.2	2.4	1.6	0.8	0.8	- -	- -
7.	Gwy.	11.4	22.8	16.5	12.7	8.0	2.3	2.3	7.4	1.1	- -	2.3
	$\bar{X}$	10.9	23.6	21.6	13.9	8.3	3.8	3.1	3.6	1.3	0.5	5.4
8.	Y.T.	29.0	34.0	7.0	10.0	10.0	3.0	3.0	1.0	- -	- -	- -
9.	F.G.	65.0	17.0	- -	3.0	4.0	4.0	3.0	2.0	2.0	- -	- -
10.	Cen.	18.0	14.0	29.0	13.0	1.0	5.0	3.0	3.0	4.0	2.0	1.0
11.	P.W.	29.0	11.0	16.0	11.0	5.0	4.0	3.0	2.0	1.0	1.0	7.0
12.	D/C	16.0	23.0	15.0	8.0	7.0	4.0	9.0	9.0	5.0	2.0	2.0
13.	Ham.	26.6	21.3	14.6	8.6	5.3	6.6	1.3	1.3	1.3	- -	- -
14.	Hur.	12.0	17.3	9.3	14.6	4.0	2.6	- -	- -	- -	4.0	2.8
15.	Lau.	62.5	22.5	5.0	5.0	1.3	1.3	1.3	1.3	- -	- -	- -
16.	V.M.	68.0	19.0	6.0	3.0	1.0	- -	3.0	- -	- -	- -	- -
17.	G.V.	42.3	3.8	11.5	10.2	5.1	2.5	3.8	- -	1.3	- -	5.1
18.	E.G.	22.5	18.7	22.5	13.7	10.0	3.7	3.7	1.3	- -	- -	- -
19.	T/H	53.2	3.9	9.0	10.3	3.6	- -	1.3	1.3	- -	- -	1.3
20.	Lam.	59.6	8.7	5.2	3.5	1.7	- -	- -	- -	- -	- -	- -
21.	Jef.	47.5	21.3	16.2	7.5	1.3	- -	1.3	1.3	- -	2.6	1.3
	$\bar{X}$	39.4	16.8	11.8	9.3	4.2	2.6	2.6	1.7	1.0	0.8	1.5

Source: Questionnaire

Figure 14(a)

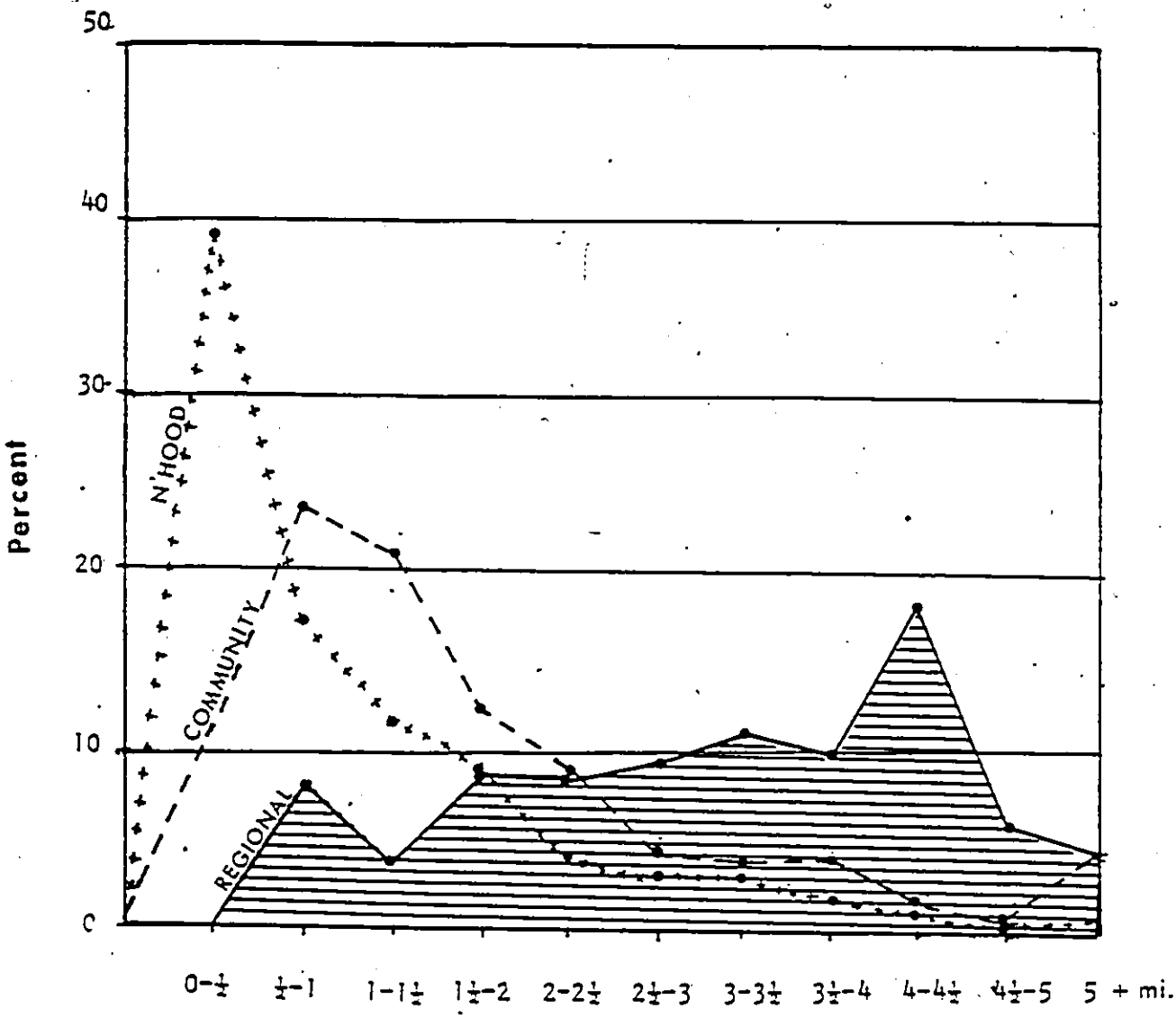
CUMULATIVE PERCENTAGE OF CUSTOMER LOCATION



Source: Author

Figure 14(b)

CUSTOMER LOCATION BY LEVEL OF SHOPPING CENTER



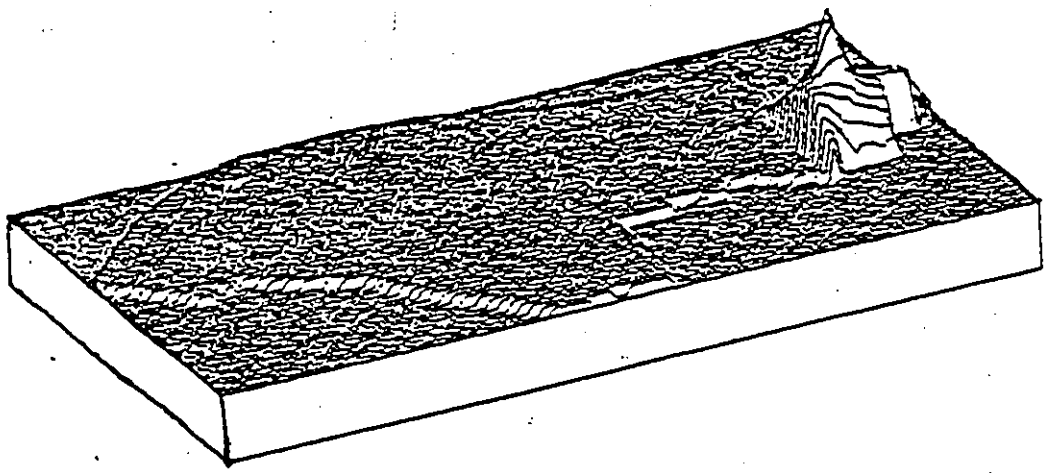
Source: Author

hcd

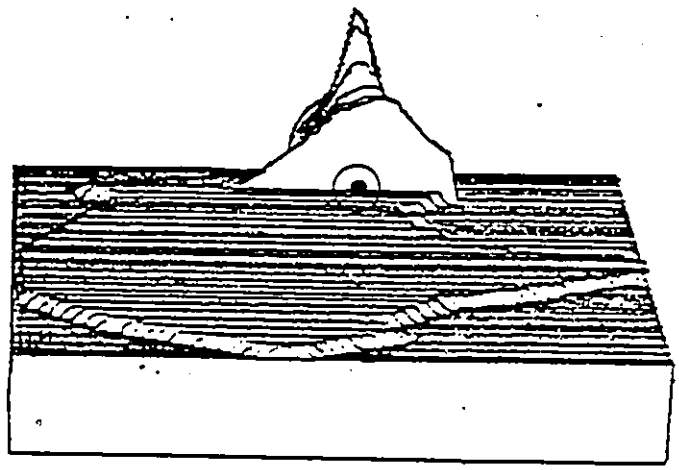
Figure 14 (c)

THREE DIMENSIONAL SURFACE CUSTOMER DISTRIBUTION

FOREST GLADE PLAZA (N'HOOD)



Cross profile



⊙ Plaza

SYMVU

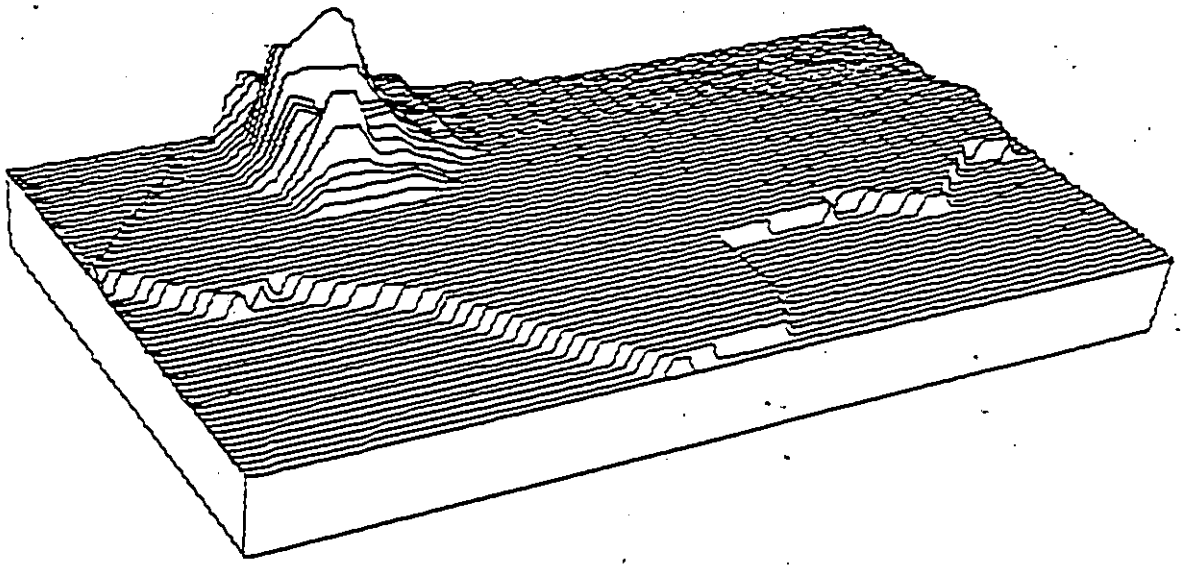
Source: Author

hcd

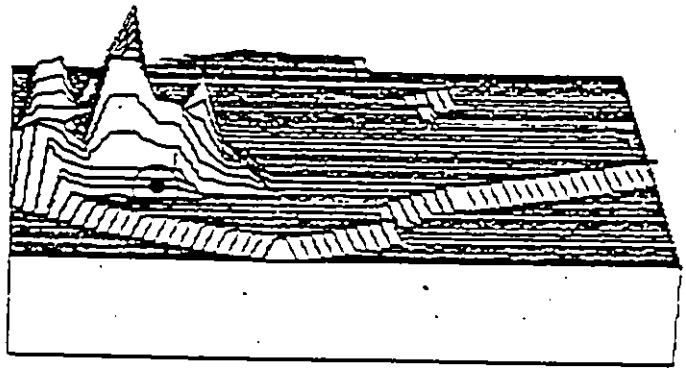
Figure 14(d)

THREE DIMENSIONAL SURFACE CUSTOMER DISTRIBUTION

UNIVERSITY MALL (COMMUNITY)



Cross profile



⊙ Mall

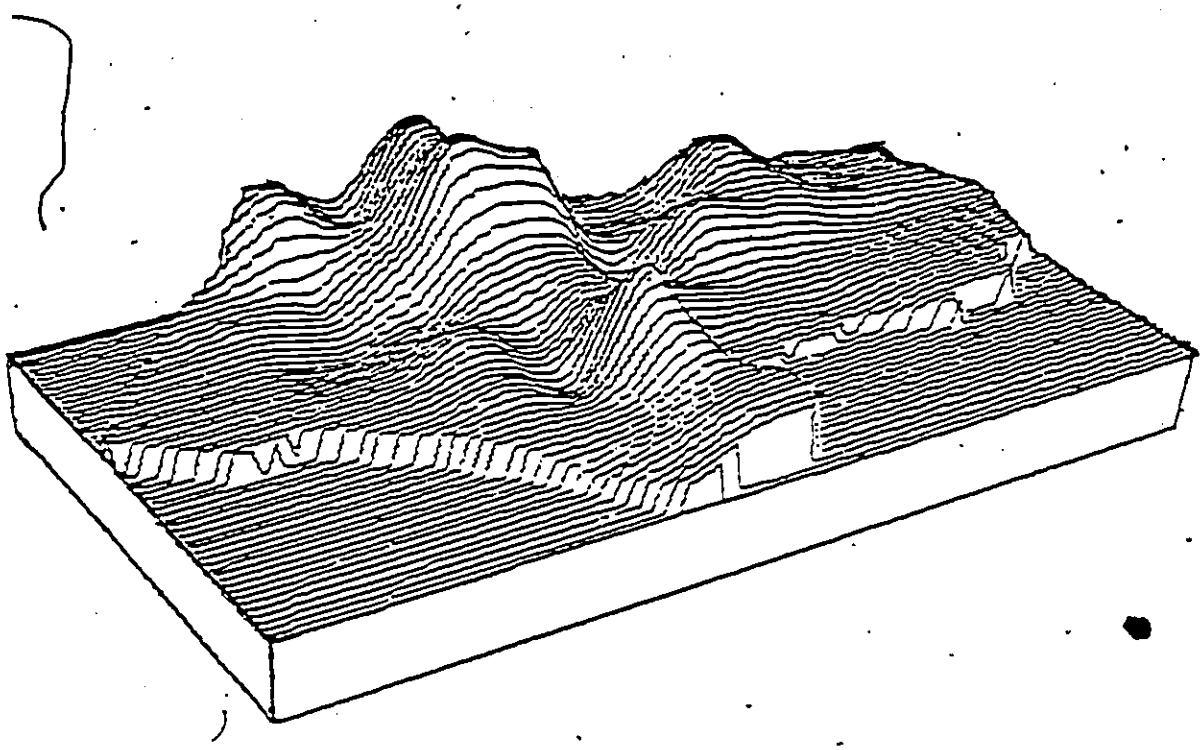
SYMVU

Source: Author

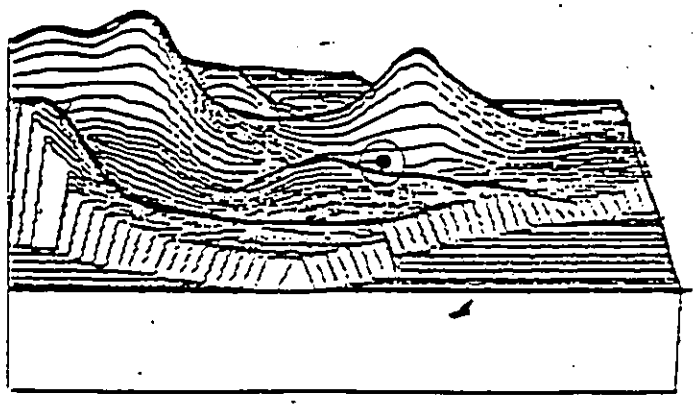
Figure 14(e)

THREE DIMENSIONAL SURFACE CUSTOMER DISTRIBUTION

DEVONSHIRE MALL (REGIONAL)



Cross profile



⊙ Mall

Source: Author

shape of the neighbourhood type and the cross profile of this center (figure 14d) clearly illustrates this. Larger centers have an ability to maintain their attraction at an increasing distance, unlike a small convenience center. This produces a more subdued profile. In the case of the regional center (Devonshire Mall), (figure 14c), the customer distribution is scattered still further away with a majority of the customers coming from the northern or near inner city area which is three or four miles distant. The eastern side of the Mall accounted for fewer customers primarily because of low population density between Dougall and Howard, and secondarily because of competition from Gateway Plaza. All the evidence reveals that there are central place characteristics existing in the three samples tested according to customer distribution or distances travelled.

The graph (figure 14a) however, indicates that space between the regional center and the community centers is very wide but the space between community centers and neighbourhood centers is much narrower, signifying that there is overlapping occurring between these two levels of centers. In other words, some centers in a certain group do not display all of the central place characteristics. This is evident through table 7c and figure 14f, that is, the average distance travelled by the customers. The distances travelled to Eastgate and Pickwick Plazas are similar to those travelled to community centers such as Ambassador Plaza and University Mall, with Central Mall and Huron Plaza even exceeding those. Furthermore, distance travelled to Dougall/Cabana Plaza is equal to that designated for community centers such as Tecumseh Mall and Eastown and Dorwin Plazas.

Several reasons can be given for this descrepancy. Pickwick Place, for example, contains a variety of shopping goods such as apparel shops not found in other neighbourhood centers and Eastgate has Valdi's and Farmer Clyde's food and produce stores. Many customers will travel greater distances to take advantage of goods being offered at "sale" prices. In addition, Eastgate as well as Huron, Dougall/Cabana and Central Mall are all located on major, heavy traffic-flow arteries, (see Traffic Flow Map, figure 10 above), enabling the distances travelled to be greater than to other neighbourhood centers. Another factor may well be that these neighbourhood centers are parasitic in nature, "free-loading" on the customer attraction of Tecumseh Mall and other larger centers. An example is of Pickwick Place Plaza "parasiting" to some extent on Tecumseh Mall (which is located directly opposite on Tecumseh Road). It is likely that it "borrows" some of its reach from that Mall - that is, some of the customers, in one trip, will go to both centers. The average of 0.6 miles distance travelled to Lambton, Lauzon, Village Market, Forest Glade and Tecumseh/Howard centers is more truly representative of the neighbourhood group, while Hampton/Rivard and Gladeview, with average distances of 1.1 and 1.0 also differ from the "norm". Again this is because of their being located on major arteries.

The average distance travelled to community centers such as Dorwin, Eastown and Tecumseh centers was 1.8 miles and even though five of the neighbourhood centers do not display central place characteristics, there is a difference between neighbourhood - ($\bar{x}$ = 1.1) and community - ($\bar{x}$ = 1.6) distances travelled.

A two sample "t" test was used to determine the significant level and the results showed evidence that community centers are significantly

Table (7c)

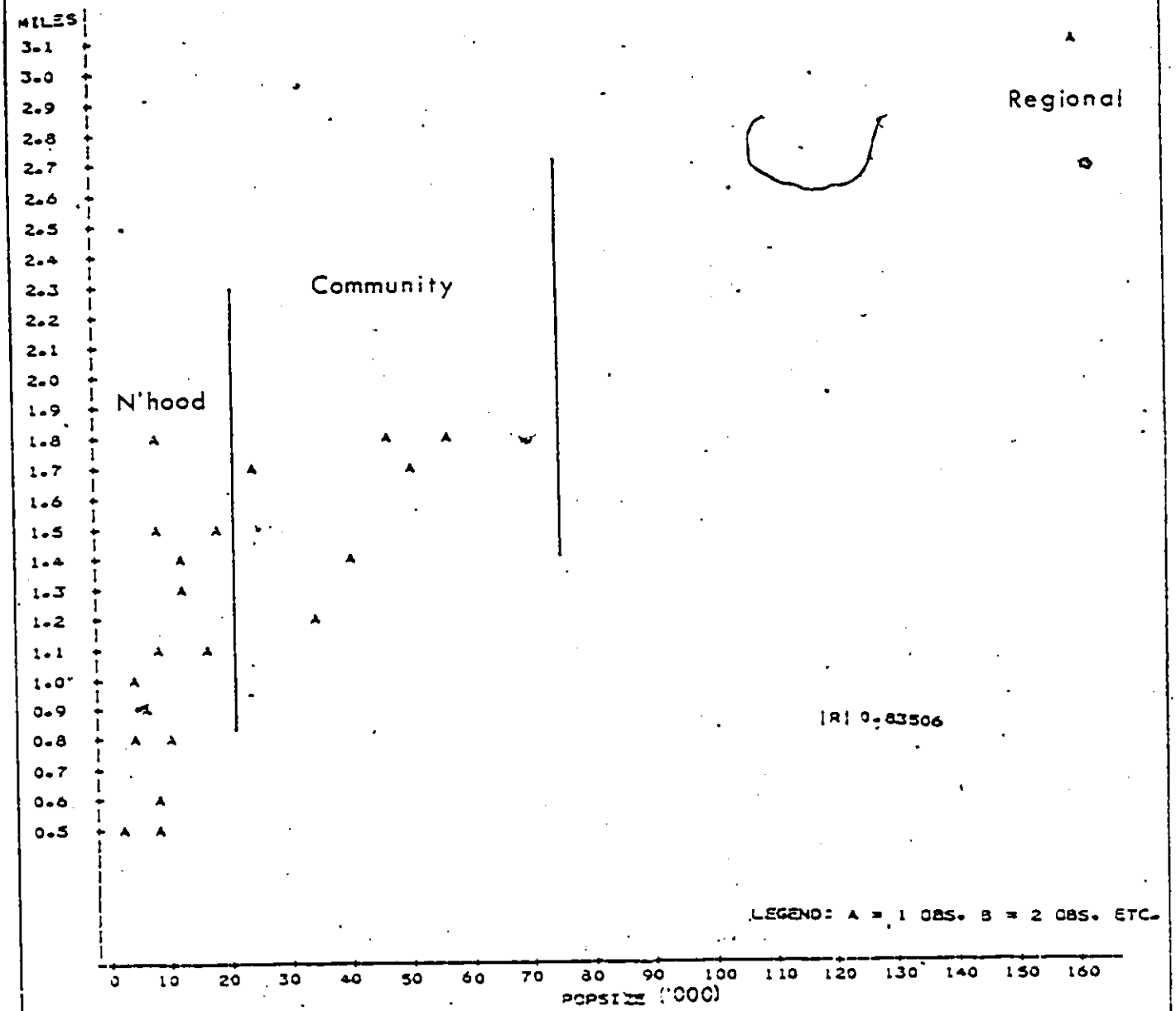
AVERAGE DISTANCES TRAVELLED BY CUSTOMERS

		Miles		Population
1.	Devonshire	3.1		159,250
2.	Tecumseh	1.8		56,050
3.	Dorwin	1.8		45,200
4.	EastTown	1.77		50,450
5.	University	1.4		39,700
6.	Ambassador	1.2		33,150
7.	Gateway	1.7	$\bar{X} = 1.6$	24,250
8.	Yorktown	1.1		16,650
9.	Forest Glade	.8		9,250
10.	Central	1.5		17,000
11.	Pickwick Place	1.4		12,800
12.	Dougall/Cabana	1.85		8,300
13.	Hampton	1.1		7,350
14.	Lauzon	.6		7,600
15.	Village Market	.56		8,200
16.	Gladeview	1.0		3,800
17.	EastGate	1.26		11,300
18.	Tecumseh/Howard	.8		4,200
19.	Lambton	.5		1,200
20.	Jefferson	.9		6,300
21.	Huron	1.5	$\bar{X} = 1.1$	7,500

Source: Questionnaire

Figure 14(f)

AVERAGE DISTANCES TRAVELLED FOR SHOPPING CENTERS



Source: Author

different from neighbourhood centers at 0.05 level in terms of the average distance travelled. The Correlation Coefficient ($r = +0.84$) also indicated that the distances travelled increase when the shopping center size increases.

Evidence from figures 14a and 14b and the Symvu Maps indicate that the majority of customers is within a $\frac{1}{2}$ mile radius in the lowest level in the hierarchy (neighbourhood centers), whereas at the highest level, customers are further away. Along with this evidence and distances travelled data (table 7c), it can be concluded that central place characteristics exist by means of distances travelled or customer location among shopping centers in Windsor. Therefore the third hypothesis is accepted.

4.2.4 TYPES OF SHOPS OR FUNCTIONS

The classification of Planned Shopping Centers proposed in the foregoing section (4.1), was based solely upon four criteria: population, gross leasable area, site area and major tenants. No account was taken of the specific types offered by each center. An analysis of the functional structure of each groups of centers follows in order to determine the applicability of the proposed classification.

Since the evidence indicates that people are willing to travel longer distances to higher level centers which purvey such merchandise as clothing, jewellery, furniture, appliances, etc., it can be expected, therefore, that these shops will be located at the higher cluster level, community and/or regional centers.

Table 8a shows in detail the "functional structure of Planned

Table (8a)

STRUCTURE OF PLANNED SHOPPING CENTERS BY FUNCTIONS

Type of Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
(1) CONVENIENCE GOODS																					
1.1 Food Stores																					
supermarket	1	1	1	1	1	1	1	1	1	1		1									
delicatessen	1		1	1						1											
grocery & meat											1		1					1			
fruit & vegetable															1					1	
other food stores										1			1	1							
1.2 Other Convenience Stores							1			1		1	1		1	1	1	1	1	1	1
convenience	1	1				1		1		1	1	1				1					
drugs			1	2	1		2							1							
beer																					
lottery																					
1.3 Other Convenience Services																					
restaurants	4		3			1	2	1	1	3	1	2		2	1				2		2
coffee shops								1	1					1	1		1		1	1	
ice cream & pop corn	3	2				1								1	1						
laundry	1	1		1	1			1		2						1		1	1		1
hair style	1	1	3			1	2	1	1	1	1	1		1	1	3	1	1	1	1	
beauty shop			1					1										1			
bank	2	1	1	1	1	1	2	2	1	1		2									
body shape			1								1							1			
amusement							1			1	1	1									
nursery										1											
(2) SHOPPING GOODS																					
2.1 General Merchandise																					
department store	3	2	1	1	1	1	1														
2.2 Clothing & Shoes																					
clothing	28	10	3		2	3			3	2	5			2	1			1			
dry goods											1		1					1			
lingery & hosiery									1		1										
shoes	10	1	1		1	1	1				1		1								
2.3 Hardware, Housewares, Furniture & Appliances																					
hardware									1	1	1										
paint & wallpaper	1		1								1					2					
antiques & ceramics					2									1					1		
draperies									1												
furniture & major appliances	3		1										1								
small appliances & housewares	1		2								1					1					
radio & television	1		1		1				1		1					1					
2.4 Other Shopping Goods Stores																					
jewellery	3	1			1	1			1									1	1		
cameras	1	1						1	1	1						1					
flowers & gifts	4	1	1					2	2	2							1	1			
toys	2	2							1												
records & tapes	1	1				1		1													
luggage & leather goods	2																				1
musical instruments																					
other	3																				
2.5 Other Retail Stores							1			1					1						
pets & pet supplies				1		1						1						1			
art galleries, picture framing							2														
books & stationery	3																				
(3) COMMUNITY SERVICES																					
dentist																1			1		
insurance agency							1												1		
real estate agency													1			1				1	
trust company	1							1	1			1									
law office								1	1										1		
travel bureau	1					1		1	1			1						1			
bookeeping										1											
optometrist	1	1					1														
library		1						1													
other services	1		3	1											1			2			

Source: Author

Table (8b)

"REPRESENTATIVE" OR "CORE" FUNCTIONS OF SHOPPING CENTER LEVELS

Berry (1959)	Garner (1966)	Present Study
NEIGHBOURHOOD		
Supermarket	Grocery	Convenience Store (Mac's)
Bakery	Bakery	Real Estate Agencies
Barbers & Beauty Salons	Meat Markets	Meat Markets
Real Estate Agencies	Eating Places	Eating Places
	Drug Stores	Drug Stores
	Dry Cleaners	Laundry Services
	Laundramat	
	Bars	
COMMUNITY		
Department Store	Department Store	Department Store
Variety Store	Variety Store	Supermarket
Men's & Women's Clothing	Men's & Boy's Clothing	Clothing
Furniture	Women's Clothing	Furniture
Florists	Candy	Gifts & Florists
Jewellers	Jewellers	Jewellers
	Liquor Stores	Beer Stores
	Shoe Stores	
	Banks	Banks
	Stationery	
	Gifts & Novelties	
REGIONAL		
Millinery		
Hosiery		
Men's & Women's Shoes		
Furriers		
Sporting Goods		
Cameras		
Photographic Studios		

Sources: Berry (1959)
Garner (1966)
Author

Table (8c)

REPRESENTATION OF FUNCTIONS IN THE SHOPPING CENTER LEVELS

	Type of Function	RF	%	CF	%	NF	%
1.	Supermarket	1	-	6	100.0	4	28.5
2.	Delicatessen	1	-	2	33.3	2	14.3
3.	Grocery & Meat	-	-	-	- -	3	31.4
4.	Fruit & Vegetable	-	-	-	- -	2	14.3
5.	Convenience Store	-	-	1	16.6	10	71.4
6.	Drugs	1	-	2	33.3	5	35.7
7.	Beer	-	-	4	66.6	-	- -
8.	Restaurants	1	-	3	50.0	8	57.1
9.	Laundry	1	-	3	50.0	6	42.8
10.	Hair Styling	1	-	4	66.6	12	85.7
11.	Coffee Shops	-	-	-	- -	7	50.0
12.	Ice Cream & Pop Corn	1	-	2	33.3	2	14.3
13.	Banks	1	-	6	100.0	4	38.5
14.	Amusements	-	-	1	16.6	3	21.4
15.	Dept. Store	1	-	6	100.0	-	- -
16.	Clothing	1	-	4	66.6	6	42.8
17.	Dry Goods	-	-	-	- -	3	21.4
18.	Shoes	1	-	5	83.3	2	14.3
19.	Hardware	-	-	-	- -	3	21.4
20.	Radio & T. V.	1	-	2	33.3	3	21.4
21.	Jewellery	1	-	3	50.0	3	21.4
22.	Cameras	1	-	1	16.6	4	28.5
23.	Flowers & Gifts	1	-	2	33.3	5	35.7
24.	Dentist	-	-	-	- -	4	28.7
25.	Realtor	-	-	-	- -	3	21.4
26.	Trust Company	1	-	-	- -	3	21.4
27.	Law Office	-	-	-	- -	3	21.4
28.	Travel Bureau	1	-	1	- -	4	28.5

F = Frequency

% = Percentages of Frequency

Source: Author

Table (8d)

CONVENIENCE & SHOPPING GOODS SHOPS IN THE PLANNED CENTERS

	CONVENIENCE GOODS				SHOPPING GOODS			
Center Id. #	Food Stores	Other Goods	Other Services	Total	Clothing & Shoes	Furniture Housewares	Other S. Goods	Total
1.	2	1	11	17	38	6	16	60
2.	1	1	5	7	11	0	6	17
3.	2	1	0	12	4	5	1	10
4.	2	2	2	6	0	0	0	0
5.	1	1	2	4	3	3	1	7
6.	1	1	4	6	4	0	2	6
7.	1	3	7	1	1	0	0	1
8.	1	1	6	8	0	3	4	7
9.	1	0	4	5	4	1	5	10
10.	3	2	9	14	2	2	3	7
11.	1	1	4	6	8	2	0	10
12.	1	2	6	9	0	0	0	0
13.	2	1	0	3	2	1	0	3
14.	1	1	5	7	2	1	0	3
15.	1	1	4	6	1	0	0	1
16.	1	2	4	7	0	4	1	5
17.	0	1	2	3	0	0	1	1
18.	1	1	4	6	2	0	2	4
19.	0	1	5	6	0	1	1	2
20.	1	1	2	4	0	0	0	0
21.	0	1	3	4	0	0	1	1

Source: Author

Shopping Centers" in Windsor categorized as convenience goods, shopping goods and community services. Convenience shops are further divided into food stores, other convenience stores and other convenience services. Shopping goods stores are divided into general merchandise, clothing and shoes, hardward, housewares, furnithre and appliances and other shopping goods stores. These sub-categories were obtained from the "Commercial Inventory Classification Sheet", (see appendix A). Some of the other retail stores and personal services categories were grouped into convenience and shopping good categories according to the nature of their function. (see section 2.3 for definitions of convenience and shopping goods).

It should be noted that for the sake of expediency, men's, women's and children's apparel of all types were grouped under the heading of "clothing". Donut shops are included in "coffee shops" and health food stores were categorized under "other food stores". Beer and liquor outlets were grouped under "beer", laundromats and dry cleaners were grouped into "laundry services" and arcades and billiard clubs come under "amusement". It should also be noted that while realizing that most of the establishmenta offer a variety of mixed goods, for the purpose of this section of this study, they were categorized according to their predominant line of merchandise or service, (e.g. drug store).

According to Garner (1966), functions are not distributed among centers in the urban area with anything like the steplike regularity typical of rural areas. In order to identify the central functions typical of different levels in the hierarchy, some functions were considered as "representations" or "cores" of nucleations at those levels. These are considered to be basic to the functioning of a nucleation at a given level in the hierarchy. Table 8b shows both Berry's (1959) and Garner's

(1966) "representative" or "core" functions of different levels in the hierarchy along with the "core" functions of this study which have been based on these categories.

ANALYSIS OF FUNCTIONS BY LEVELS OF CENTERS

Neighbourhood Centers

According to the central place theory, the major representations of the neighbourhood level are convenience goods and services. For the present study, seven functions were identified as being "truly representative" samples of functions or "core" functions of neighbourhood level shopping centers in Windsor. They are: convenience stores (such as Mac's Milk), meat markets, eating places (restaurants), drug stores, laundry services and real estate agencies.

Table 8c shows the representation of functions in the shopping center levels, but does not show how many establishments are in each function at each center. It merely indicates the frequency of occurrence of each function, the maximum frequency at this level being fourteen (there are fourteen neighbourhood centers included in this study). None of the seven "core" functions appears in all centers at this level. Hair-styling shops and convenience stores are the prominent functions and represent in 57.1% and 50% of the total centers respectively. All the community services such as real estate agencies (core), trust companies, law offices, travel bureaus and dentists appear in more than 20% of the total centers, the latter two being 28.5%. It is interesting to note that higher level functions such as clothing stores appear in 42.3% and camera shops in 28.5% of the total neighbourhood centers respectively.

The type of functions and number of establishments at each center is shown in table 8d. This table indicates that many higher order

functions are found at this level which illustrates the more complex distribution of functions at centers in the urban area. This finding agrees with Garner's Chicago Study. According to this table, Pickwick Place has eight (or 36%) and Central Mall has four (or 16.6%) clothing and shoe stores of the total establishments at those centers. Dougall/ Cabana has four and Yorktown has three household, furniture and appliance goods shops and Central Mall, Yorktown and Forest Glade have five, four and three other shopping good shops respectively. However, ten of the fourteen centers have more than 25% of other convenience service shops. Thus the data reflect the dominance of convenience functions while at the same time they show variability of occurrence of hopping goods stores.

Community Centers

Theoretically, community centers contain all the neighbourhood functions as well as some additional higher order functions. Department stores, supermarkets, clothing, furniture, gift and florist, jewellery stores, banks and beer stores are considered to be the core functions at this level (along with neighbrouhood level functions). It is also to be expected that the community level should contain a greater number of duplications than do neighbourhood level centers.

In contrast to the data regarding the neighbourhood level, three of the eight community level core functions are fully represented (100%) in all six community level centers, viz. department stores, supermarkets and banks. Another three functions, beer (66.6%), clothing (66.6%) and jewellery (50%) are represented in 50% and over whereas flowers and gifts and furniture appear in only 33.3% and 16.6% of the centers at this level. None of the community services listed in table 8a are available with the

exception of one travel bureau. Shoe stores (a regional level representation), are present in 83.3% of all the community level centers. Other convenience community services such as restaurants, laundries and hair styling shops, appear in 50% of the centers.

The types of functions of shops and number of establishments at community centers are listed in table 8d. In general, centers at this level are functionally more complex than the lower level centers. Thirty-three percent of the community centers have more than 50% of the total shopping goods shops whereas only 16% (or one center) has convenience shops above the 50% mark. Furthermore, 50% of the centers have below 25% of the total establishments devoted to convenience type shops and services. In the Tecumseh, University and Gateway centers, 37, 25 and 17% of the establishments are devoted to clothing and shoe shops which reveals the dominance of shopping good functions.

Regional Center

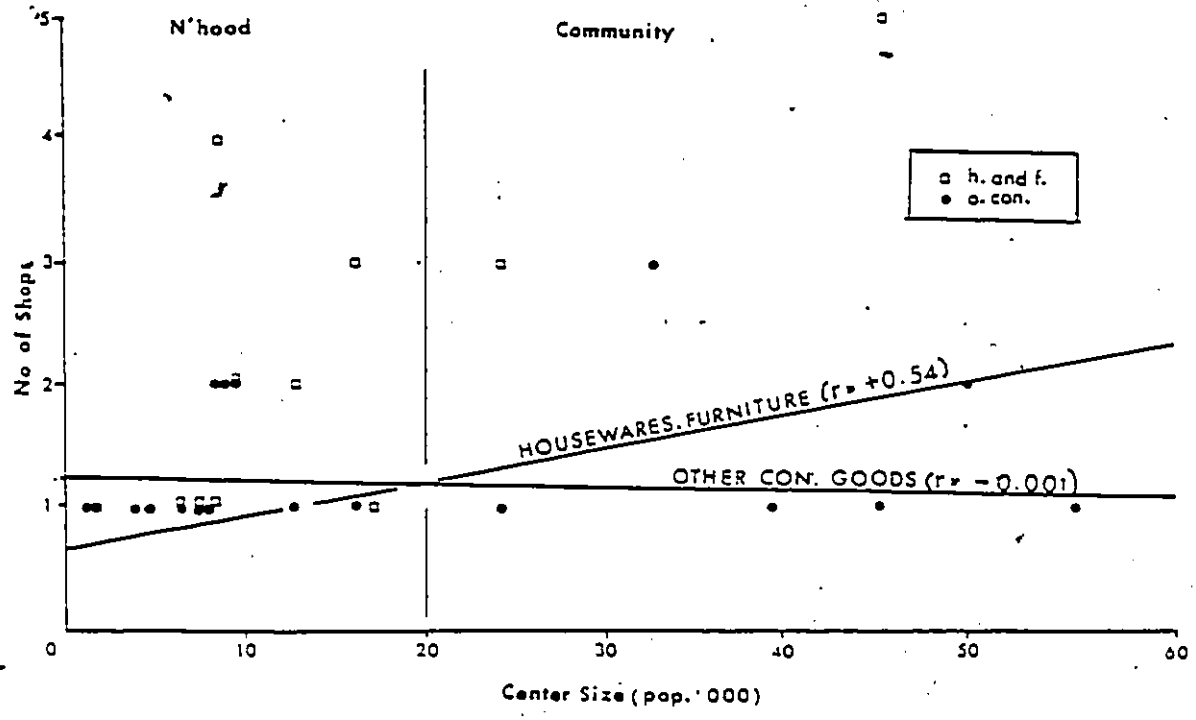
Central functions typical of this level are millinery, hosiery, shoes, furs, sporting goods and cameras. Since Devonshire Mall is the only regional center, frequency or percentage figures would be of little importance. However, tables 8a and 8c show that this center contains all the main shopping goods (except hardware), and most of the convenience goods shops, with meat, fruit and vegetable shops being exceptions.

At the regional level, ice cream and pop corn shops and restaurants (lower order functions), are more numerous than in any of the lower level centers. This is not, however, as significant as the increase in the number of higher order good shops such as department stores, clothing, shoes and furniture stores. Other shopping goods such as jewellery, flo-

Figure 15(a)

CONVENIENCE AND SHOPPING GOOD SHOPS

BY CENTER SIZE



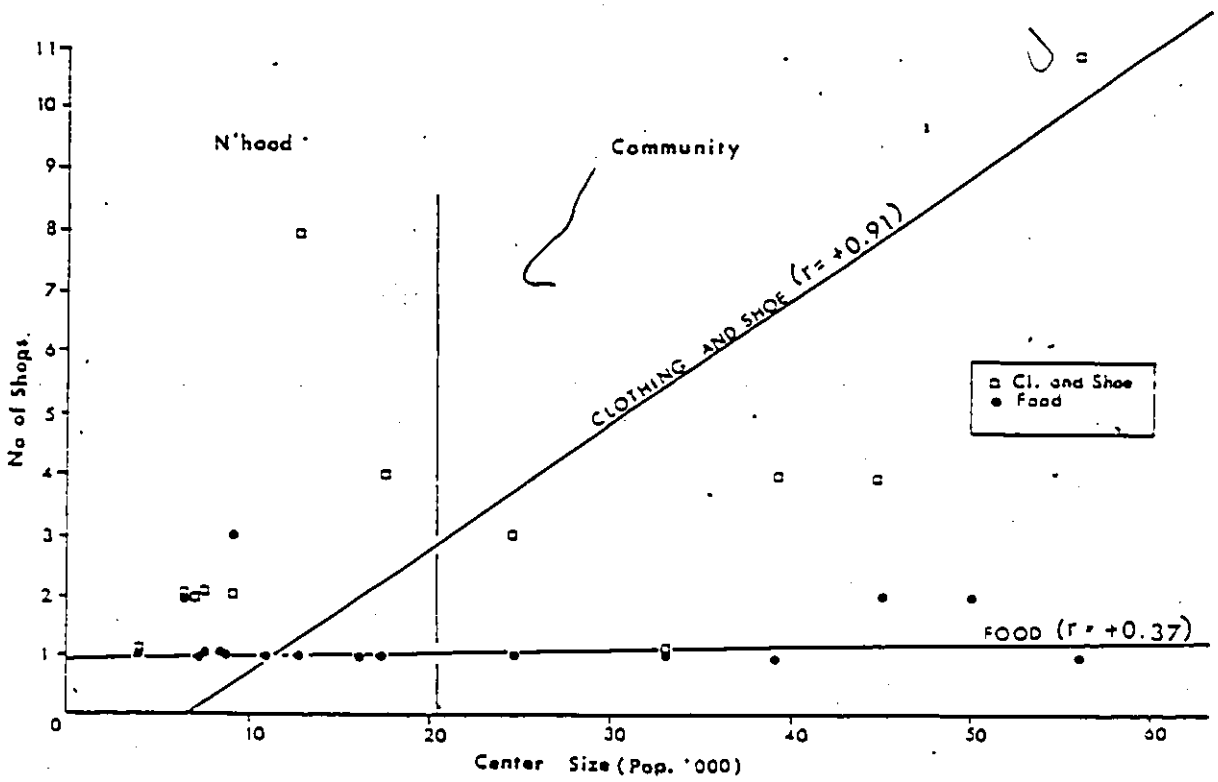
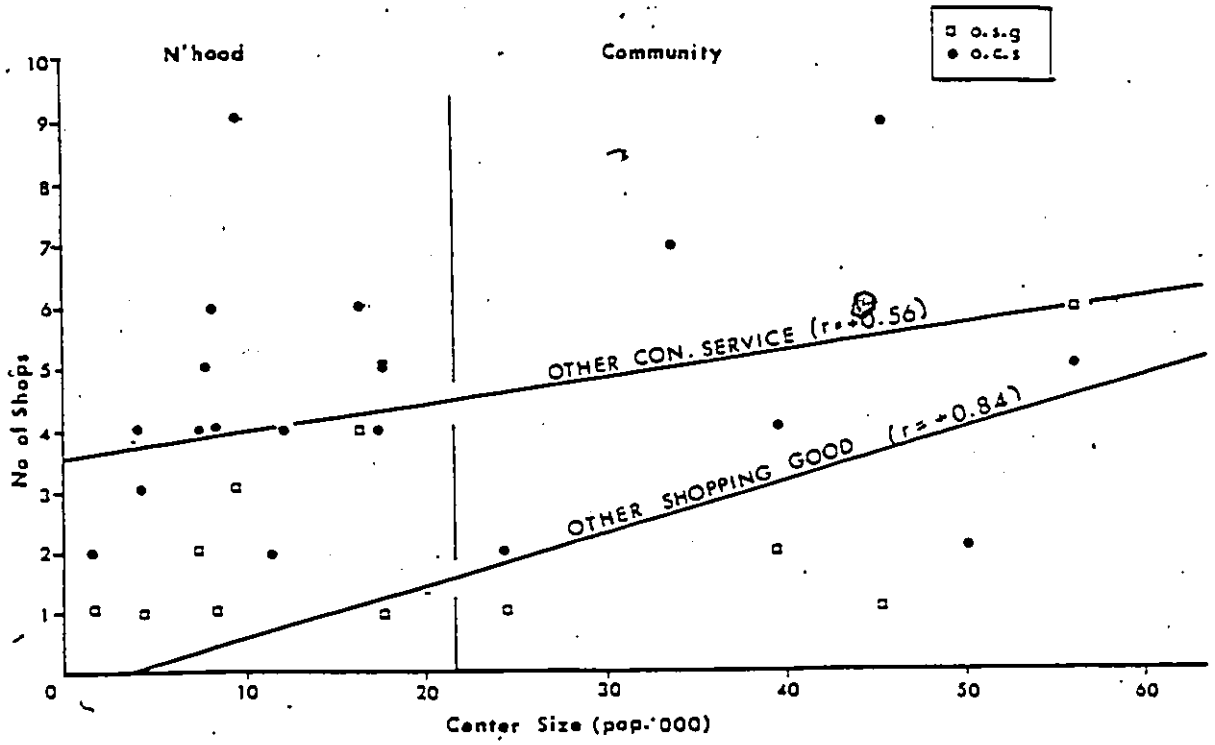
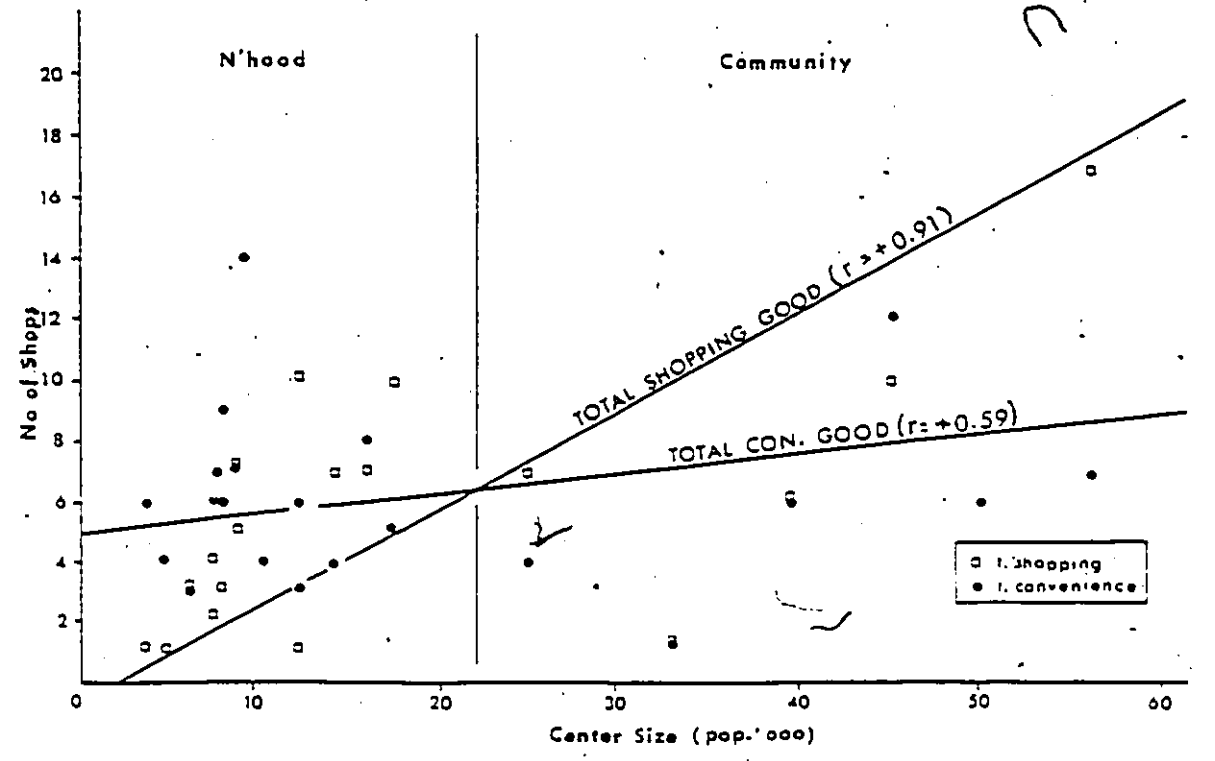


Figure 15(b)

CONVENIENCE AND SHOPPING GOOD SHOPS

BY CENTER SIZE





hcd

Source: Author

wers and gifts, luggage and leather goods also have a higher number of establishments. Clothing and shoe shops account for 41.8% of the total number of establishments and other shopping goods account for 17.6%. All the shopping goods together account for 66% of the total establishments whereas all the convenience goods and services shops only account for 18.7%.

Up to this point, the functional structure of the shopping center by types of goods or functions representation and the total number of different types of shops have been analysed in each of the levels. Figures 15a and 15b show how shopping goods shops and convenience goods and services shops are related to the shopping center size. The Pearson Product Moment Correlation Coefficient test was used to analyse this characteristic. The population size of the centers was used as the center size. To simplify the explanation of variations between "shopping goods shops" and "convenience goods shops", separate comparisons were made of 1) other convenience good shops and household good shops; 2) clothing and food shops; and 3) other service shops and other shopping good shops. The classification of shopping goods and convenience goods has already been given in table 8a.

Figure 15a shows a negative correlation ($r = -0.001$) between other convenience stores and a moderate correlation ($r = +0.54$) between houseware and appliance good shops and shopping center sizes. The least square line for food shops paralleled the horizontal axis and ($r = +0.37$) shows that there is no great difference in the number of food shops among the Planned Centers. However, the clothing and shoe shops category shows high ($r = +0.91$) correlation. Figure 15b indicates the relationship between "other convenience services" and "other shopping goods". Again there is

a difference in the association of the two types of goods and services. "Other convenience services" is moderately correlated because even the higher level centers have a greater number of convenience services such as restaurants, ice cream parlours and hair-styling shops.

From these correlation corfficients (r) and least square lines, it is evident that the relationship between the number of convenience shops and services and the planned centers is negative to moderate, whereas that of the shopping good shops (categories) and center size was moderate to highly correlated. In addition, the total number of shops and services for convenience good shops and services ($r = +0.59$) and shopping goods shops ($r = +0.91$) indicate that there is a moderate and a high correlation with the center size. This evidence supports the hypothesis (#4) that the "number and the proportion of shopping goods shops is greater in higher order centers" and that central place characteristics exist according to types of goods among the planned centers in Windsor.

V FLOOR SPACE FOR DIFFERENT TYPES OF GOODS

From the previous hypothesis it was concluded that the number of shopping goods shops in a center is directly related to the center size in the hierarchy of Planned Shopping Centers. Convenience goods shops are inversely related. Garner's Chicago Study (1965), shows that the proportion of floor space devoted to convenience goods is directly related to the proportion devoted to other uses, but inversely related to the proportion of floor space devoted to shopping goods for "retail nucleations". This section will analyse the same hypothesis for Planned Shopping Centers in the City of Windsor.

Table 9 and figure 16a show the floor space devoted to convenience

goods, other types of goods as well as vacant space in percentages for the three levels of Planned Shopping Centers in Windsor. Other retail stores (2.5) and community services (3) are listed under "other". Figure 16a shows that on the neighbourhood level, 56% of floor space is covered by convenience type goods and at the community level the percentage has lowered to 31.9 (approximately half that of neighbourhood centers, whereas the regional center's proportion is a mere 12.3%. Figure 16a also shows that shopping goods' floor space is inversely related to convenience type floor space. However, the proportion of shopping goods floor space at 63.3% in the community level center is almost three and a half times higher than that of neighbourhood centers whose proportion is 19.3%. The difference between community (63.3%) and regional (82.4%) is not nearly so great compared with that between community and neighbourhood. This is because all community centers have large department stores as major tenants. Even though the regional center has a greater number of clothing and household goods stores than the community level centers, their average floor space is very small.

The proportion of floor space devoted to other types of goods is not directly related to the proportion devoted to convenience type goods floor space because of a lower proportion (3.6%) in the community level. The difference between each group is small compared with other types of goods (shopping and convenience), which account for 9.7% of floor space in neighbourhood centers and only 3.6% and 5.3% in community centers and the regional center.

In contrast with the high proportion of floor space devoted to shopping goods in regional centers, 82.4% of neighbourhood centers devote only 56.0% to convenience goods. This is partly due to the larger

TABLE (9)

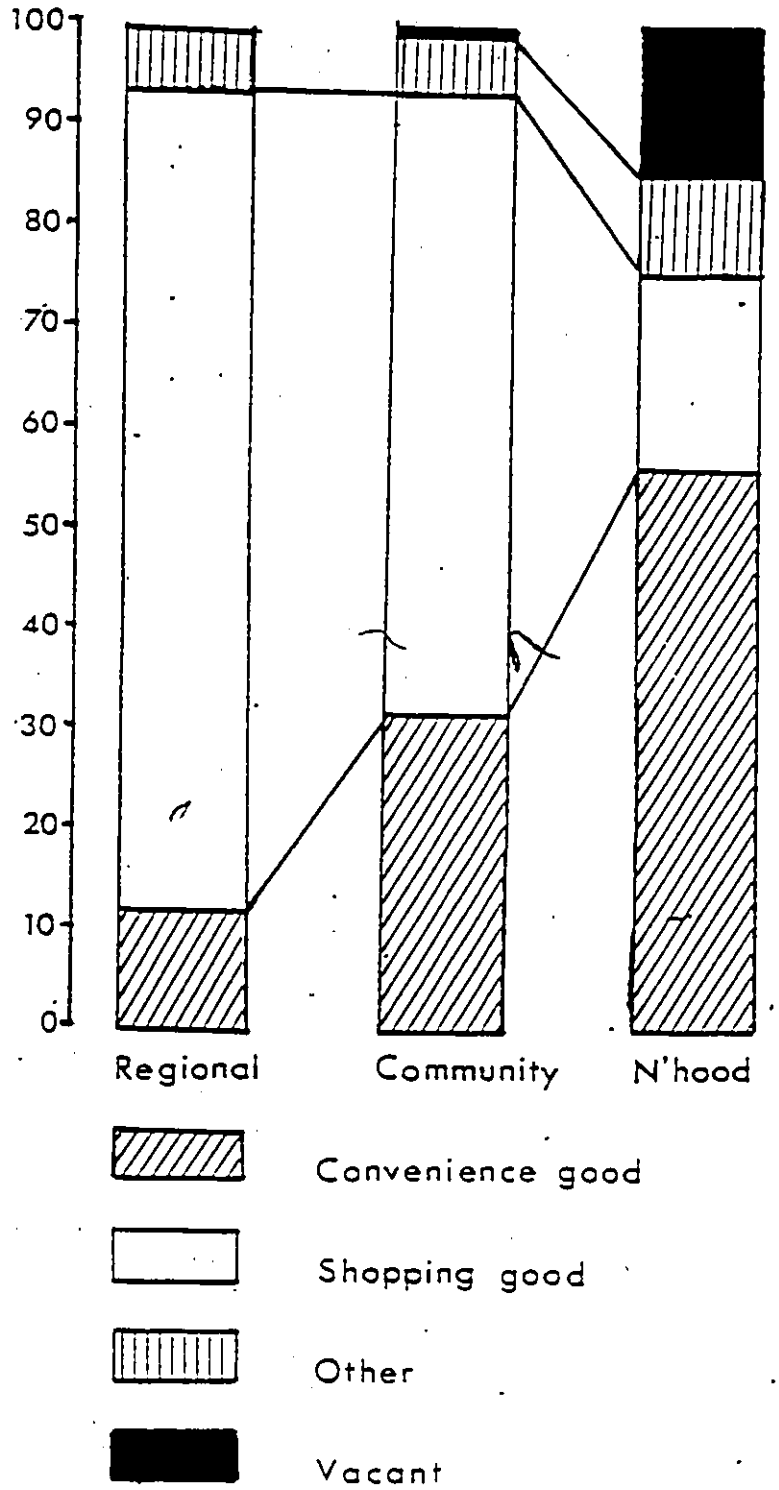
FLOOR SPACE FOR DIFFERENT TYPES OF GOODS

ID#	CENTER	CONVENIENCE GOODS	SHOPPING GOODS	OTHER	VACANT
	Regional				
1.	Devonshire	12.3	82.4	5.3	- -
	Community				
2.	Tecumseh	20.0	78.4	1.6	- -
3.	Dorwin	37.6	53.6	4.2	4.6
4.	Eastown	35.7	63.5	0.8	- -
5.	Gateway	21.3	71.3	6.2	1.2
6.	University	34.8	61.1	4.1	- -
7.	Ambassador	42.3	52.3	4.3	1.5
	$\bar{x}$	31.9	63.3	3.6	1.2
	Neighbourhood				
8.	Yorktown	66.5	20.0	11.5	2.0
9.	Central	64.3	22.5	5.5	7.7
10.	Forest Glade	76.9	14.0	5.9	3.2
11.	Pickwick Place	46.6	15.8	31.3	6.3
12.	Village Market	83.5	- -	4.1	12.5
13.	Jefferson	17.8	60.2	- -	22.0
14.	Huron	46.6	19.1	9.9	24.4
15.	Gladeview	64.2	6.3	- -	29.3
16.	Dougall/Cabana	50.0	20.2	21.9	7.9
17.	Lambton	25.9	11.9	- -	62.2
18.	Hampton/Rivard	45.1	25.5	23.3	6.0
19.	Lauzon	61.6	11.0	15.0	12.4
20.	Eastgate	78.0	- -	7.0	15.0
21.	Tecumseh/Howard	57.0	43.0	- -	- -
	$\bar{x}$	56.0	19.3	9.7	15.0

Sources: City of Windsor Planning Department
Metro Construction Company
Field Work

Figure 16 (a)

FLOOR SPACE FOR DIFFERENT TYPES OF GOODS BY LEVEL OF SHOPPING CENTER



Source : Author

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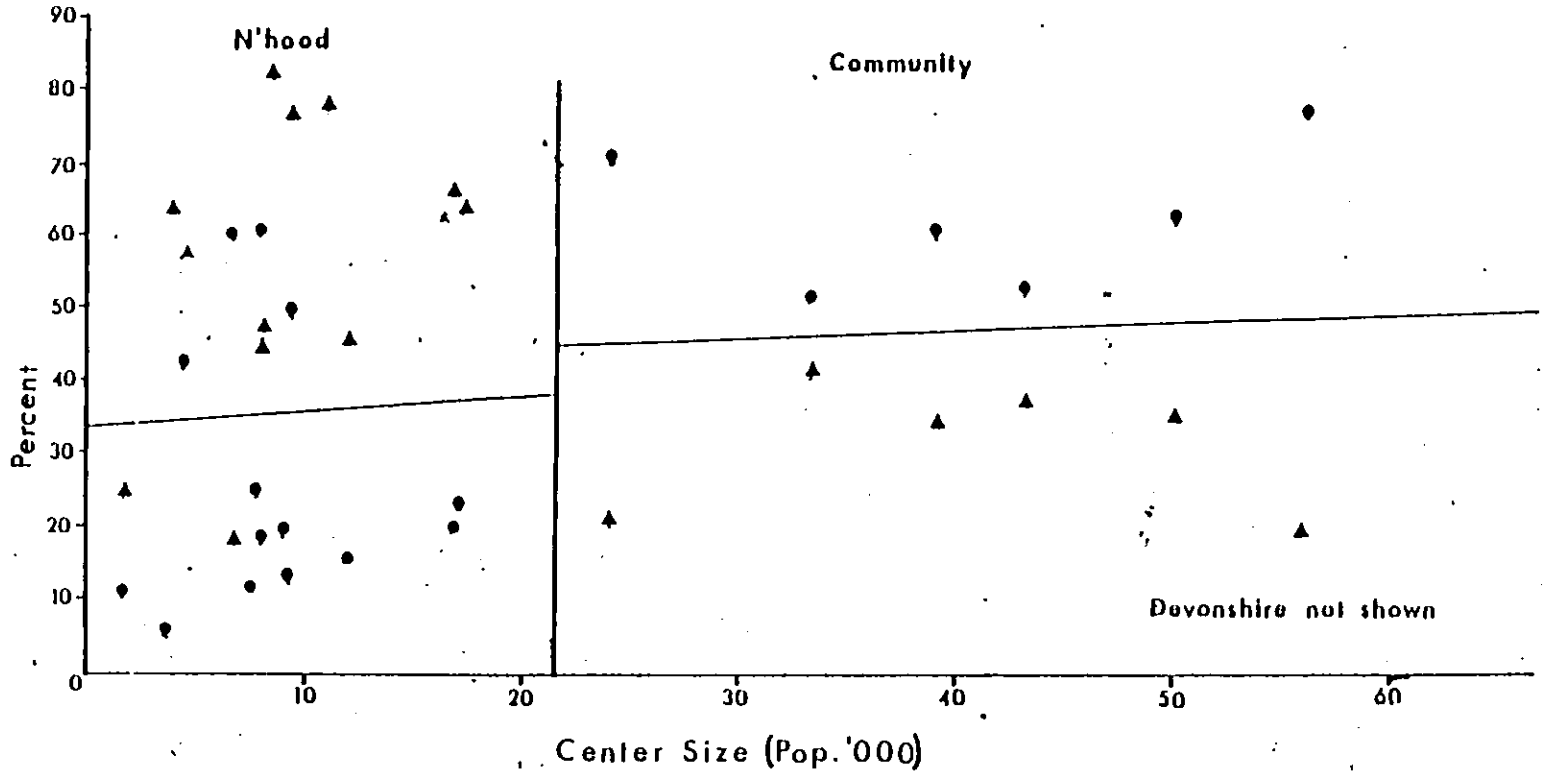
Figure 16(b)

FLOOR SPACE FOR CONVENIENCE AND SHOPPING GOODS



Source: Author

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proportion of vacant space in neighbourhood centers, and even the floor space devoted to convenience goods by the anchor tenants is very much smaller than that which they devote to shopping goods.

Table 9 shows the inverse relationship in vacant space with shopping center size. All the neighbourhood centers have vacant space with the exception of Tecumseh/Howard Plaza. Newly build Lambton Plaza has the highest proportion of vacant space (62.2%) due to its mediocre location in a very low population density area. Gladeview, Huron and Jefferson Plazas also have high percentages of vacant space, 29.3, 24.4 and 22.0 percent respectively. Each of these centers is located on a major artery (figure 10), away from predominantly residential areas. Another serious factor which contributes to the high percentage of vacant space is the current adverse economic situation (national and more especially, local), which has greatly increased the risk of survival to small business ventures. Finally, while there is fourteen times more vacant space in neighbourhood than in community centers, the regional center has no vacant space at all. The main reason is that customers are more willing to travel further to larger centers for milti-purpose visits and investors are more will to risk locating in the more prestigious centers.

Figure 16b, using the percentages of gross leasable floor area in actual use, distinctly indicates by the solid line the difference between the proportions of convenience and shopping goods floor space in each group. This figure also shows, however, that among the neighbourhood centers, Jefferson and Tecumseh/Howard Plazas both have a high proportion of shopping goods floor space. This is a deviation from the Central Place characteristics and is explained by the presence of a fabric shop at the former and a music shop at the latter. Pickwick Place Pla-

za is also near the breaking line and this can be ascribed to its relatively large number of clothing shops. The very low proportion of convenience type goods at Lambton Plaza can be attributed to the high proportion of vacant land adjacent to this center.

From the evidence presented through table 9 and figures 16a and 16b, it can be concluded that the proportion of floor space devoted to convenience goods is directly related to the shopping centers' levels, while shopping goods floor space is inversely related. The hypothesis (#5), that shopping goods floor space takes a high proportion in higher order centers is therefore accepted. Also, from the demonstration of the evidence, the applicability of the classification of centers into different levels in a hierarchy based upon the analysis of population size and number of establishments, etc., is upheld.

4.2.6 DISTANCE TRAVELLED FOR SHOPPING GOODS AND CONVENIENCE GOODS

In general, it appears that the average distance a consumer travels to purchase a convenience good is considerably shorter than a trip made to purchase a shopping good, (Nystuen, 1959). Even though Berry (et al., 1962) and Thomas and Yeates, (1966), emphasize this through customer flow maps, their studies were done only at the regional level for villages and cities. The following section will analyze this hypothesis at the intra-urban level for Planned Shopping Centers in Windsor.

Table 10a and figure 17a show the average distances travelled for convenience and shopping goods at the different levels in the hierarchy as well as at individual centers in Windsor. All the data for this manipulation were derived from the questionnaire. According to the table, the average distance travelled for convenience goods is 2.8 miles and for

shopping goods, 3.5 miles at the refional level, 1.2 and 2.4 miles at the community level and 1.1 and 1.8 miles at the neighbourhood level. It was proven that there is a significant difference between the average length journey travelled for convenience and shopping goods at neighbourhood and community levels in the hierarchy at a 0.05 significant level. The difference of the length of the journey for shopping goods however, is twice that travelled for convenience goods (1.2 miles at the community level), while the difference is .7 miles at the other two levels. The explanation probably lies in the greater attraction, from a distance, of the K-Mart and Woolco type department stores which for a long time have had a low or moderate price image.

The average distance travelled for convenience goods increases with the level of the shopping center - 1.1 miles at the neighbourhood level, 1.2 miles at the community level and 2.8 miles at the regional level, as determined by the two sample "t" test with no significant difference between the neighbourhood and community levels. Even though a similar trend occurs for shopping goods, the difference between the neighbourhood level and the community level at 0.6 miles is lower than that of 1.1 miles between the community and regional levels. There are some centers at the neighbrouhood level which do not display central place characteristics. Again, the low or moderate price image projected by some department stores is a probable influence which causes a greater spread in trade areas.

The scatter diagram (figure 17a), clearly indicates a distinct difference between the length of distance travelled for shopping goods and convenience goods at the regional and community levels. At the neighbourhood level however, some centers cross the dividing line for their

Table (10a)

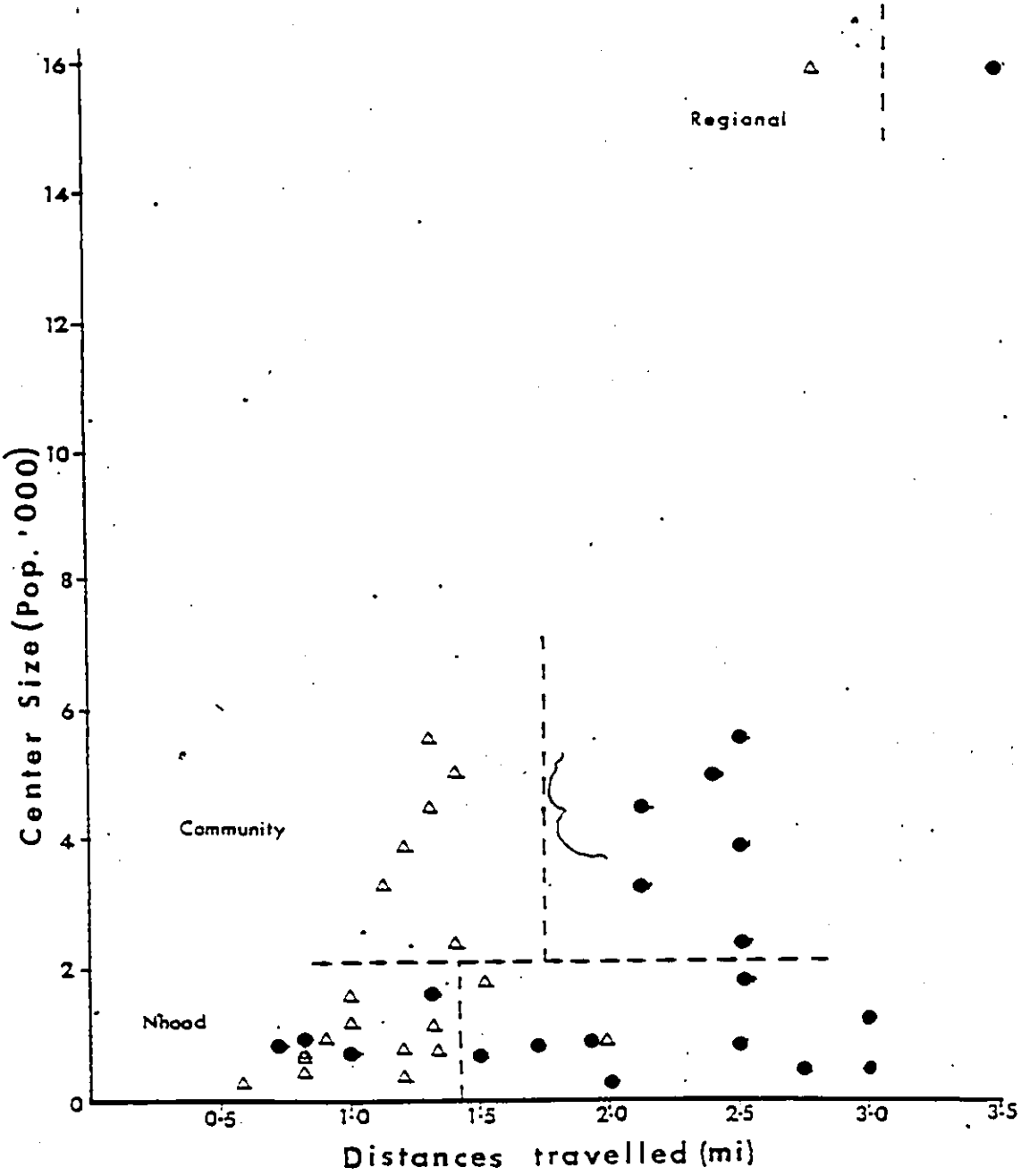
AVERAGE DISTANCES TRAVELLED FOR CONVENIENCE AND SHOPPING GOODS

	Center	Convenience Goods (Miles)	Shopping Goods (Miles)
1.	Devonshire	2.8	3.5
2.	Tecumseh	1.3	2.5
3.	Dorwin	1.3	2.1
4.	Eastown	1.4	2.4
5.	Gateway	1.4	2.5
6.	University	1.2	2.5
7.	Ambassador	1.1	2.1
	$\bar{X}$	1.2	2.4
8.	Yorktown	1.0	1.3
9.	Central	1.5	2.9
10.	Forest Glade	0.9	0.8
11.	Pickwick Place	1.0	2.2
12.	Village Market	0.7	- -
13.	Jefferson	0.8	1.5
14.	Huron	1.2	1.7
15.	Gladeview	1.2	3.0
16.	Dougall/Cabana	2.0	1.9
17.	Lambton	0.6	2.0
18.	Hampton	1.3	2.5
19.	Lauzon	0.8	1.0
20.	EastGate	1.3	- -
21.	Tecumseh/Howard	0.8	3.0
	$\bar{X}$	1.1	1.8

Source: Questionnaire

Figure 17(a)

AVERAGE DISTANCES TRAVELLED FOR CONVENIENCE AND SHOPPING GOODS



Source: Author

hcd

category. Central Mall and Gladeview and Hampton/Rivard Plazas show the same distance travelled for shopping goods as do Tecumseh and University Malls and Gateway Plaza at the community level. This is mainly due to their being located on major arteries of the city (figure 10). The same reason, in addition to there being a music store at the Tecumseh/Howard Plaza, made its average distance for shopping goods even higher than that for the community level centers.

In contrast to the theory given in the referrence literature (see above), the average distances travelled to the Forest Glade and Dougall/Cabana centers for convenience goods exceeds those travelled for shopping goods by 0.1 mile. Forest Glade's supermarket draws customers from beyond the Forest Glade community. Data regarding the Dougall/Cabana center (which is located on the perimeter of the city on a major artery leading out into the County), revealed that most of its shoppers stopped only to buy cigarettes or snacks, while enroute to other destinations, some of these outside the city. The distances travelled is therefore greater for convenience goods than for shopping goods. Village Market and Eastgate centers have no data for shopping goods distances because they only house convenience goods shops.

The cumulative percentages of distances travelled for convenience and shopping goods by zones one mile apart - up to five miles from the center within the city limits for different levels in the hierarchy are shown by table 10b and figure 17b. These are in addition to the data cited above. Table 10c and figure 17c show customer locations in percentages by one mile zones from the center. These percentages are also calculated only as far as five miles. Figures 17d and 17e illustrate customer location in detail both within as well as outside the city. (Two

Table (10b)

DISTANCE TRAVELLED FOR SHOPPING AND CONVENIENCE GOODS IN CUMULATIVE PERCENTAGE AT THE HIERARCHY

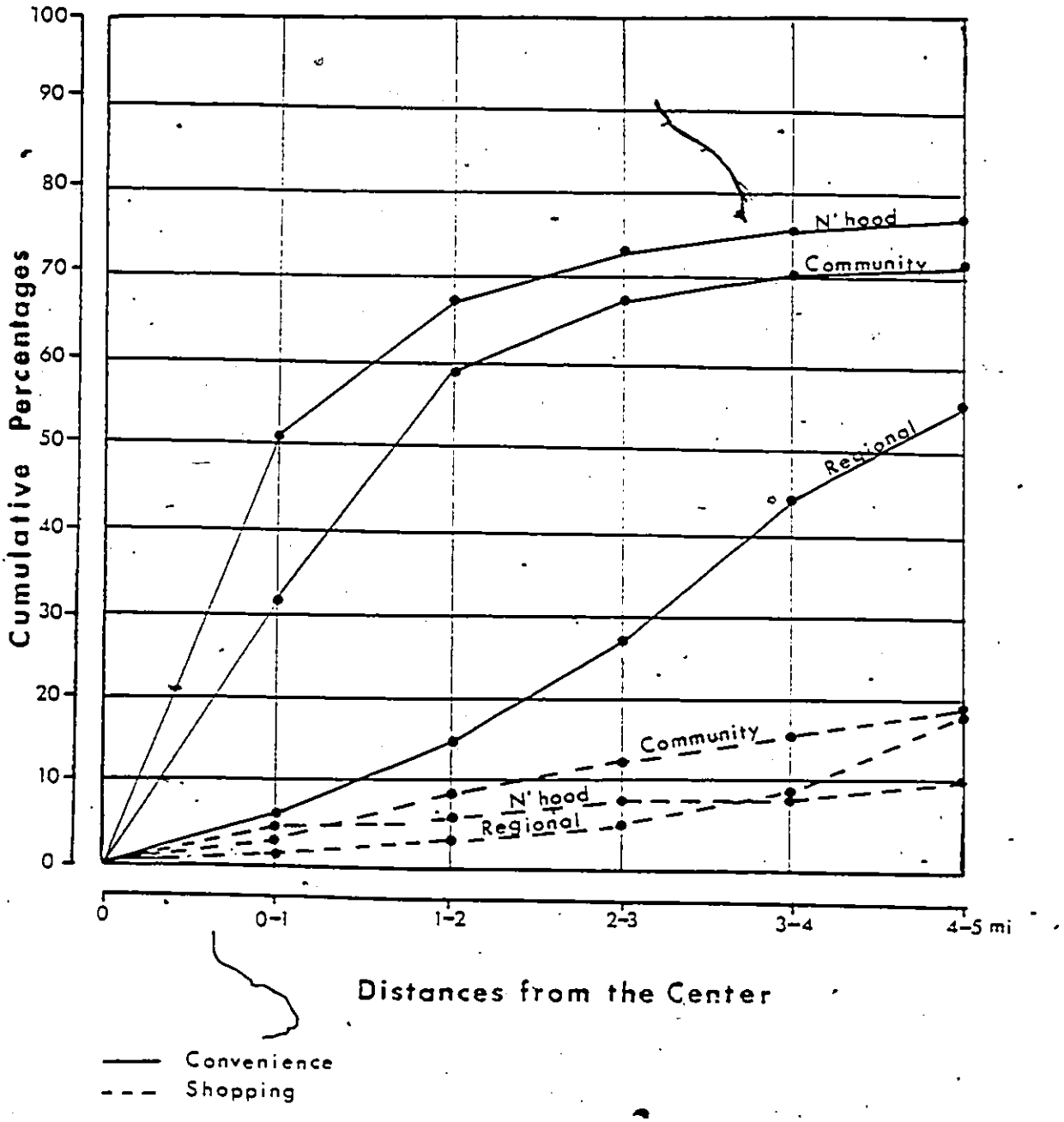
		0-1	1-2	2-3	3-4	4-5
REGIONAL	*	5.8	14.8	27.3	44.0	55.5
		1.0	2.9	6.1	9.9	18.9
COMMUNITY	*	31.8	59.4	67.1	70.4	71.1
		2.4	9.2	13.4	16.2	19.2
NEIGHBOURHOOD	*	50.4	67.3	73.0	76.5	72.9
		2.8	5.9	7.2	9.0	10.1

* Convenience Goods %

Source: Questionnaire

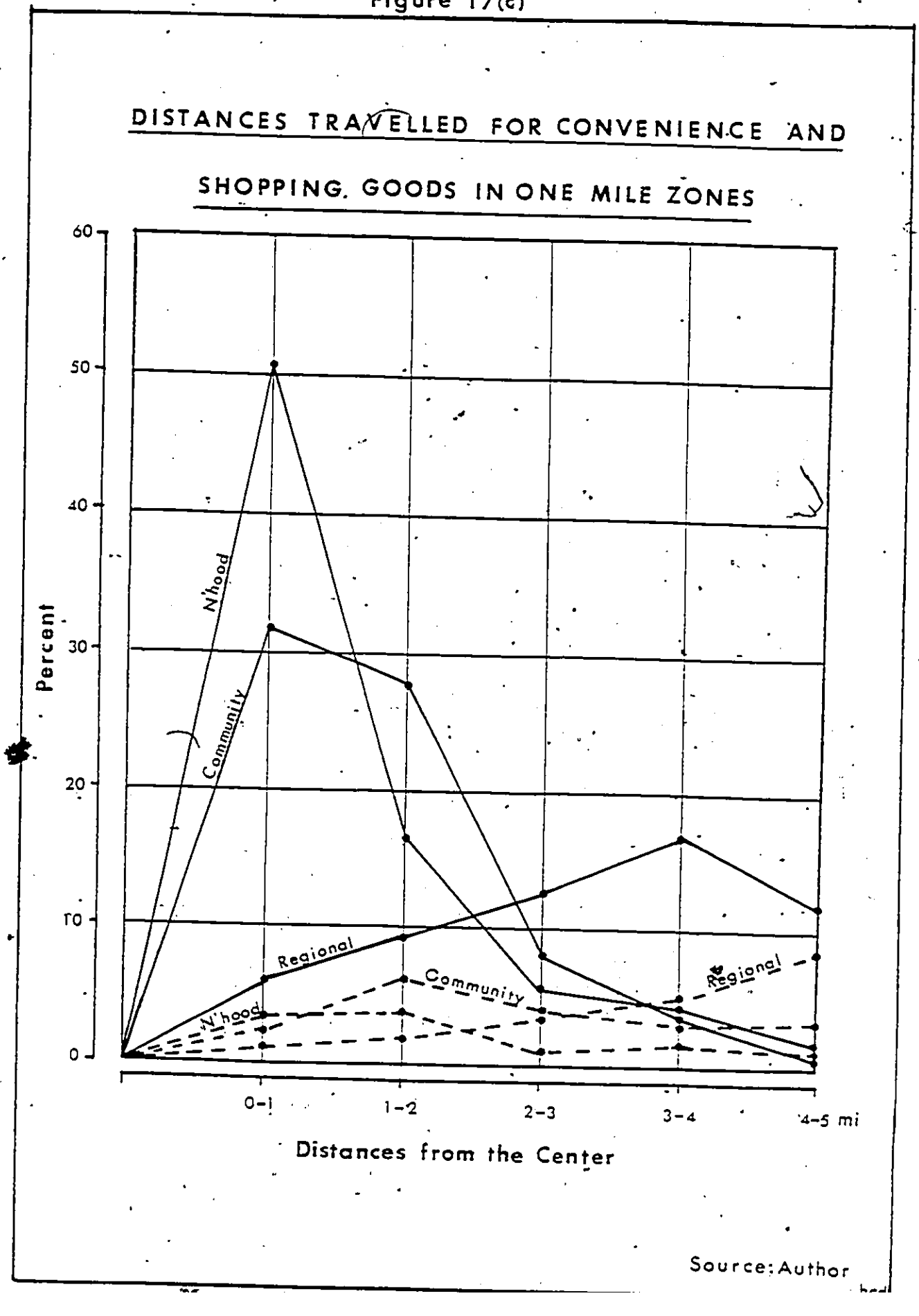
Figure 17(b)

DISTANCES TRAVELLED FOR CONVENIENCE AND SHOPPING GOODS IN CUMULATIVE PERCENTAGES



Source: Author

Figure 17(c)

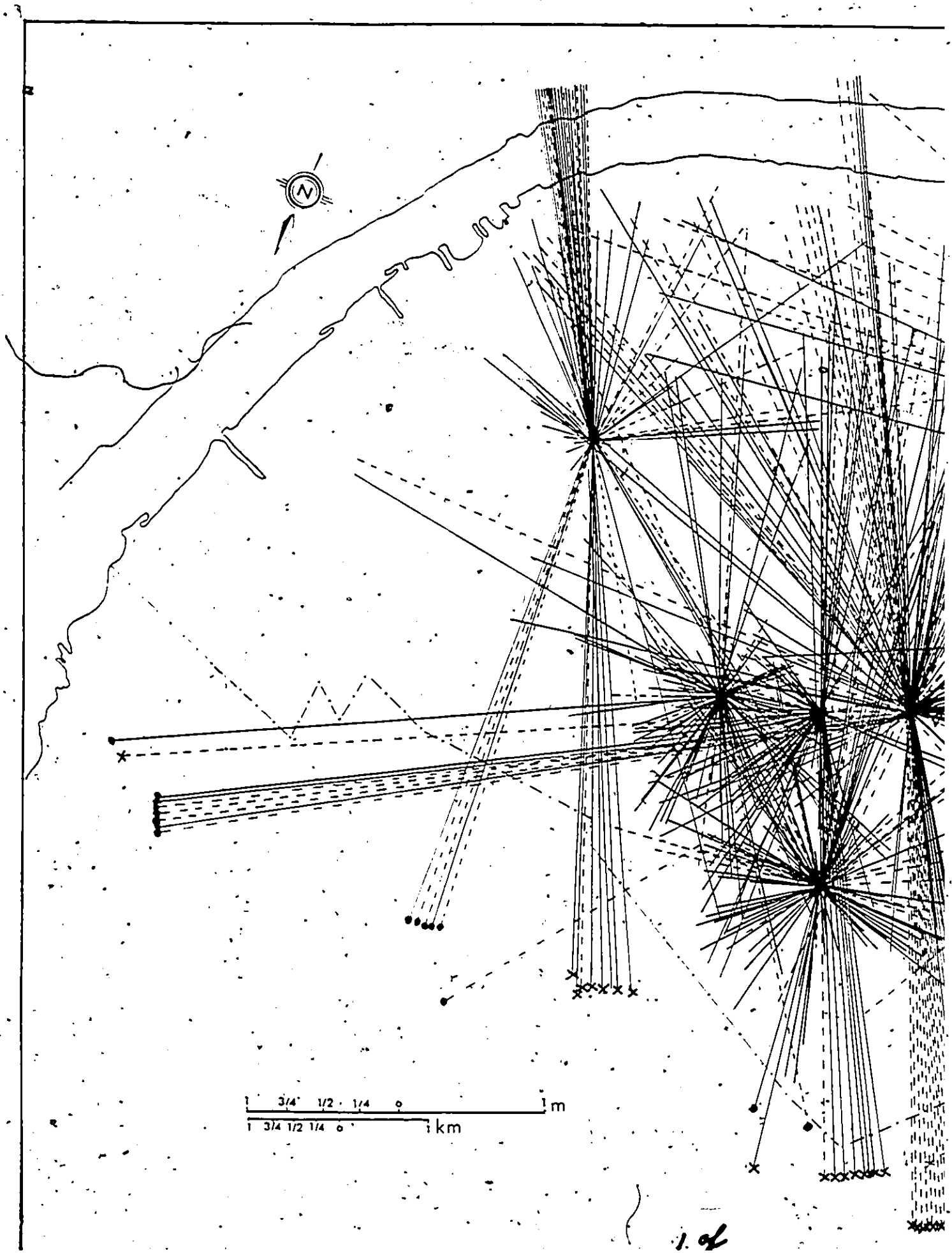


Source: Author

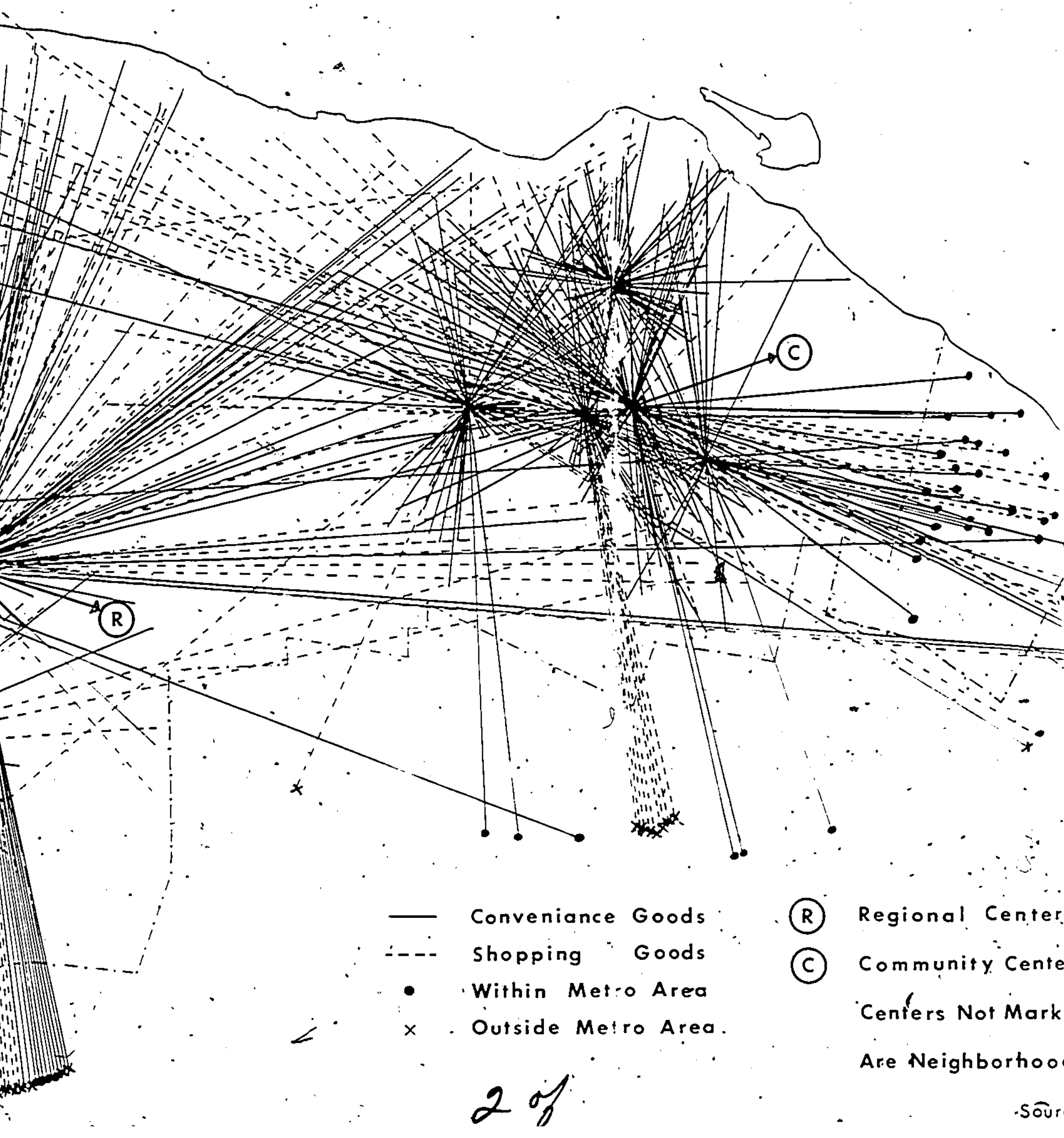
maps were used for reasons of providing greater clarity because of the complexity of overlapping of the centers within the urban area). Customer locations beyond the city limits are studied separately. Customers who came from the metropolitan area (LaSalle, St. Clair Beach, Tecumseh, etc.), are indicated by a (●) Symbol, while those who came from outside the city or Metro area are identified by an (X) Symbol.

According to figures 17b and 17c and tables 10b and 10c, a higher percentage (16.7) of the customers who shopped for convenience goods at the regional level, travelled from the three to four mile radius, whereas 9% of those shopping for shopping goods came from the four to five mile zone. At the community level, a higher (31.8) percentage of customers for convenience goods is from within the one mile radius while for shopping goods it is from the one to two mile radius. A majority (50.4%) is from within the one mile radius while 3.1% for shopping goods is from the one to two mile zone. Notably, a higher percentage of customers for both neighbourhood and community level centers is from the same mile radius for both types of goods. The percentage of customers declines from 50.9 to 16.9 percent after the one mile radius for convenience goods and from 3.1 to 1.8 percent for shopping goods at the neighbourhood level. Only a moderate decline of 4.2% (from 31.8% to 27.6%) is shown for convenience goods at the same mile radius at the community level.

This study is limited to the confines of the city limits of Windsor, as previously stated. Nevertheless, since the interviews were all taken from customers who were at the centers at one particular time and since quite a number of them were found to have come from outside the city limits, the analysis was extended to include these, and interesting results were obtained. Table 10d indicates the percentages of customers


N
1 3/4 1/2 1/4 0 1 m
1 3/4 1/2 1/4 0 1 km

CONSUMER TRAVEL PATTERN FOR CONVENIENCE AND SHOPPING GOODS



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CONSUMER TRAVEL PATTERN FOR CONVENIENCE AND SHOPPING GOODS

Conveniance Goods

Shopping Goods

Within Metro Area

Outside Metro Area

(R) Regional Center

(C) Community Center

Centers Not Marked Are Neighborhood

3 of 3

Source: Author

Figure 17(d)

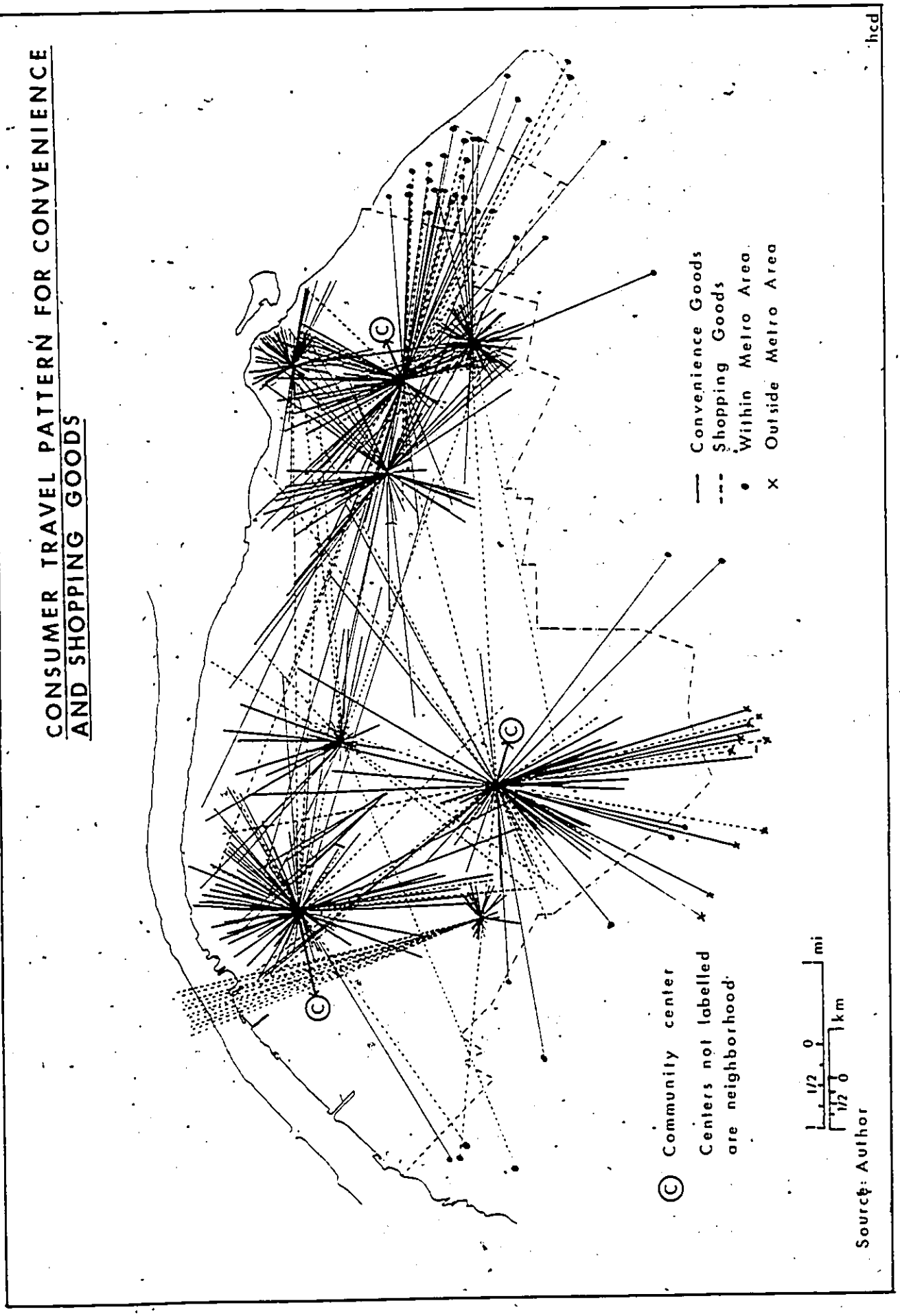

CONSUMER TRAVEL PATTERN FOR CONVENIENCE AND SHOPPING GOODS
Convenience Goods
Shopping Goods
Within Metro Area
Outside Metro Area
Community center
Centers not labelled are neighborhood
1/2 0 mi
1/2 0 km
Source: Author
hcd

Table (10c)

DISTANCE TRAVELLED FOR CONVENIENCE AND SHOPPING GOODS BY ONE MILE ZONES

	Miles	0-1	1-2	2-3	3-4	4-5
1.	Devonshire	* 5.8	*9.0	*12.5	**16.7	*11.5
		1.0	1.9	3.2	3.8	9.0
2.	Tecumseh	*17.9	*32.8	* 1.2	* 1.2	* 1.2
		3.7	10.5	9.3	5.5	6.8
3.	Dorwin	*27.5	*30.3	* 1.4	* - -	* - -
		- -	9.6	6.8	2.75	- -
4.	Easttown	*20.0	*19.2	*12.3	* 2.0	* - -
		4.0	9.6	4.1	4.8	4.8
5.	Gateway	*34.5	*27.3	* 9.5	* 8.8	* .6
		1.2	4.2	1.2	3.6	3.6
6.	University	*53.3	*22.9	* 6.3	* 4.2	* 2.8
		1.4	2.1	1.4	2.8	1.4
7.	Ambassador	*38.0	*33.3	* 3.0	* 2.2	* - -
		3.8	5.3	2.2	- -	1.5
	Total Community	*31.8	27.6	7.7	3.3	0.7
	Shopping Goods	2.4	6.8	4.2	2.8	3.0
8.	Yorktown	*58.0	*16.3	*11.2	* 4.1	* - -
		6.0	1.0	2.0	1.0	- -
9.	Central	*31.0	*16.3	* 5.0	* 6.0	* 4.0
		1.0	1.0	1.0	5.1	1.0
10.	Forest Glade	*75.4	* 1.9	* 7.6	* 4.8	* 1.9
		1.0	.9	- -	- -	- -
11.	Pickwick Place	*35.0	*13.0	* 5.0	* 2.0	* - -
		5.0	44.0	4.0	4.0	6.0
12.	Village Market	*86.0	* 8.0	* 1.0	* 3.0	* - -
		- -	- -	- -	- -	- -
13.	Jefferson	*57.2	*14.3	* 1.1	* 2.2	* 1.4
		3.3	6.6	- -	- -	1.1
14.	Huron	*25.0	*13.8	* 5.0	- -	* 2.5
		2.6	8.7	1.3	- -	1.2
15.	Gladeview	*39.0	*26.1	* 6.5	* 4.4	*19.5
		- -	- -	- -	3.3	- -
16.	Dougall/Cabana	*21.4	*11.3	* 6.6	*14.0	* 7.4
		14.7	10.1	3.6	2.7	6.4
17.	Lambton	*58.3	* 7.5	* 1.6	* - -	* - -
		- -	- -	2.9	- -	- -
18.	Hampton	*42.7	*22.7	*10.8	* 1.4	* - -
		5.2	- -	1.3	2.6	1.3
19.	Lauzon	*83.0	* 7.9	* 2.4	* 2.4	* 2.4
		- -	1.2	1.2	- -	- -
20.	Eastgate	*41.2	*36.2	*13.7	* 5.0	* - -
		- -	- -	- -	- -	- -
21.	Tecumseh/Howard	*52.9	*18.0	* 2.4	* - -	*13.2
		- -	- -	1.2	7.2	2.4
	Total N'hood	*50.4	*16.9	* 5.7	* 3.5	* 1.4
	Shopping Goods	2.8	3.1	1.3	1.8	1.1

* Convenience Goods
Source: Questionnaire

from within the Metro area (LaSalle, Tecumseh, etc.), as well as those from outside, such as Leamington, London and some points in the United States. At all levels in the hierarchy, whether from within or outside the Metro area, the total percentage of customers who visited for convenience goods is greater than for shopping goods mainly because of the occasional customers who visited solely to purchase small goods such as cigarettes, candy or other snacks, etc. However, at the neighbourhood level, the transient customers who visited for shopping goods were in a higher percentage (3.3) than for convenience goods (3.1). For example, the primary reason shoppers stopped at Lambton Plaza is because of its highly specialized "Canadiana" souvenir shop which attracts a large number (20.8%) of the center's customers, many of whom are tourists who travel along Huron Church Road (Highway #3) to or from the Ambassador Bridge and/or Highway 401. Another example at the same level is Huron Plaza which also attracts 11.2% of its customers from outside the Metro area vecause it contains the only china/ceramics gift shop in the immediate vicinity.

Exactly fifty percent, that is seven of the fourteen centers at the neighbourhood level, did not obtain any customers from outside the Metro area, whereas only one center, Eastown Plaza with 16% at the community level, displayed this characteristic. However, 12.4% of customers for convenience goods and 6.2% of customers for shopping goods visited from within the perimeter of the Metro area - mainly from the towns of Tecumseh, Belle River and environs. Eastown's N & D, as the nearest and largest supermarket, draws the greatest number of customers from these areas. Huron Plaza, on the bridge route to and from the U. S. A. as well as the Highway 401 route, is at the lowest level and inte-

Table (10d)

DISTANCES CUSTOMERS TRAVELLED FOR CONVENIENCE AND SHOPPING GOODS FROM OUTSIDE CITY LIMITS

		Metro	Out of Metro	Total
1.	Devonshire	* 5.7	* 8.1	*13.8
		3.8	6.7	10.5
2.	Tecumseh	* 3.1	*1.2	* 4.3
		1.2	3.7	4.9
3.	Darwin	* 1.0	* 4.0	* 5.0
		0.8	3.0	3.8
4.	EastTown	*12.4	* - -	*12.4
		6.2	- -	6.2
5.	Gateway	* 1.8	* 3.0	* 4.8
		2.3	0.6	2.9
6.	University	* 0.7	* 0.1	* 0.8
		0.7	0.1	0.8
7.	Ambassador	* 2.3	* 3.8	* 6.1
		1.5	2.3	3.8
	$\bar{x}$	* 3.5	*2.0	* 5.5
		2.1	2.3	3.7
8.	Yorktown	* 1.0	- -	1.0
		- -	- -	- -
9.	Central	* 1.0	- -	* 1.0
		* - -	1.0	1.0
10.	Forest Glade	* 5.6	* - -	*5.6
		- -	- -	- -
11.	Pickwick Place	* 3.0	* 2.0	* 5.0
		- -	7.0	7.0
12.	Village Market	* 2.0	- -	* 2.0
		- -	- -	- -
13.	Jefferson	* 4.4	* 1.0	* 5.4
		4.4	3.3	7.7
14.	Huron	* 1.2	*25.0	*26.2
		2.5	11.2	13.7
15.	Gludeview	*18.5	- -	18.5
		- -	- -	- -
16.	Dougall/Cabana	* - -	- -	- -
		1.8	- -	1.8
17.	Lambton	* 8.9	- -	* 8.9
		- -	20.8	20.8
18.	Hampton	* 1.3	* 8.0	* 9.3
		1.3	1.3	2.6
19.	Lauzon	* 1.2	- -	* 1.2
		- -	- -	- -
20.	Eastgate	* 3.9	- -	* 3.9
		- -	- -	- -
21.	Tacumseh/Howard	* 6.0	* 7.2	*13.2
		2.4	2.4	4.4
	$\bar{x}$	* 4.1	* 3.1	* 7.2
		0.9	3.3	4.2

* = Convenience Goods

Source: Questionnaire

restingly, draws 25% of its customers for convenience goods from outside the Metro area because of there being three restaurants and a lottery shop on its premises. The lower percentage of customers from outside the Metro area at the neighbourhood level illustrates central place characteristics but Jefferson, Huron, Lambton, Hampton/Rivard and Tecumseh/Howard centers have a higher percentage of customers because of their locations on main traffic arteries.

It was also of interest to discover that 18.5% of the customers who came to the Gladeview center came for convenience goods. This was mainly because of the Valdi store's low, discount prices on groceries which are comparable in quality and by brand name to those being sold in the supermarkets at higher prices. The current economic situation has had an effect on the willingness of customers to travel greater distances to take advantage of discount pricing and special sales and many will now travel farther to shop for convenience goods.

Although the overall percentage of customers who travelled from outside the city limits for convenience goods is greater than for shopping goods, the facts obtained from figures 17a, 17b, and 17c, and tables 10a, 10b, and 10c illustrate that the distance travelled for shopping goods is higher than that for convenience goods at the three levels of the hierarchy. The hypothesis #6 is therefore accepted.

4.3

This section will focus on the consumer behaviours at the different levels of the hierarchy.

4.3:1 MODE OF TRANSPORTATION

Increased levels of automobile ownership in many parts of the

Table (11)

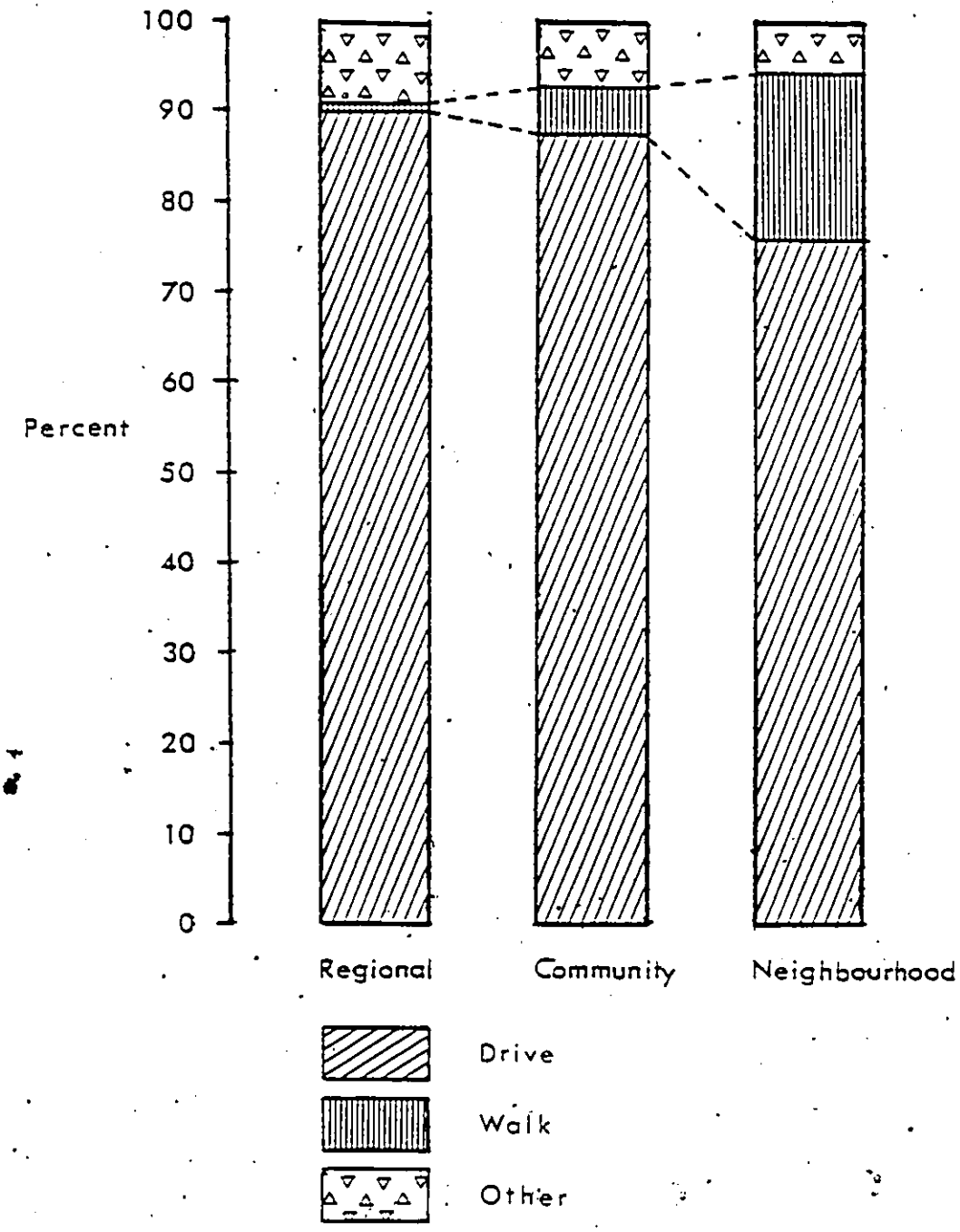
MODE OF TRANSPORTATION BY SHOPPING CENTER LEVELS

ID#	CENTER	DRIVE	WALK	OTHER
	Regional			
1.	Devonshire	90.0	1.0	9.0
	Community			
2.	Tecumseh	79.0	8.6	12.4
3.	Dorwin	89.0	3.5	7.5
4.	Eastown	94.0	4.0	2.0
5.	Gateway	95.6	2.8	1.6
6.	University	81.0	7.0	12.0
7.	Ambassador	84.5	8.5	7.0
	$\bar{x}$	87.1	5.8	7.1
	Neighbourhood			
8.	Yorktown	94.0	5.0	1.0
9.	Central	82.0	14.0	4.0
10.	Forest Glade	75.0	20.0	5.0
11.	Pickwick Place	72.0	23.0	5.0
12.	Village Market	66.0	29.0	5.0
13.	Jefferson	69.0	22.0	9.0
14.	Huron	88.0	11.0	13.0
15.	Gladeview	68.0	19.0	13.0
16.	Dougall/Cabana	78.0	7.0	15.0
17.	Lambton	78.0	16.0	6.0
18.	Hampton/Rivard	83.0	12.0	5.0
19.	Lauzon	68.0	26.0	6.0
20.	Eastgate	83.0	9.0	8.0
21.	Tecumseh/Howard	60.0	36.0	4.0
	$\bar{x}$	76.0	17.8	6.2

Source: Questionnaire

Figure 18

MODE OF TRANSPORTATION BY LEVEL OF SHOPPING CENTER



Source : Author

hcd

world have radically re-oriented shopping habits (Johnston, 1969). Although the planned shopping center structure was designed to cater to shoppers travelling by car, theoretically a higher percentage of pedestrian customers is expected to patronize neighbourhood centers since these are located in high population areas.

Table 11 shows the customer mode of transportation by individual centers as well as by means of hierarchical groups in percentages. Figure 18 represents the graphical explanation of the mode of transportation at three different levels. From the graph it is obvious that the proportion of people who travelled by car is directly related to the center level while the proportion of people who walked to the centers is inversely related to the center levels. Of the shoppers interviewed, 90% travelled to the regional center by car, whereas this mode of transportation accounts for 87.1% for the community centers and a much lower 76% for the neighbourhood centers. The proportion of pedestrian-to-total customers in the neighbourhood centers is 17.8%. This proportion is three times as large as that of community centers at 5.8%. Only 1.0% (or one-sixth of the community level's proportion), came to the regional center on foot. This is because Devonshire Mall, on a major artery, is located in the midst of a large industrial, transportation and vacant land area adjacent to the E. C. Row Expressway. Other studies have shown a low walk-to-shop proportion for very large shopping centers. Also directly related to the shopping center size of the Central Place are other modes of transportation such as buses, bicycles and taxis. Nine percent of the shoppers used other means of transportation to visit Devonshire Mall (regional center), because it is well served by public transit. Most customers were from the downtown area and even students

from as far away as the University were willing, despite the greater distance, to travel to Devonshire Mall to shop there instead of at the much closer University Mall because of the availability of good public transport. The 1.0% gap between the community level (7.1%) and the neighbourhood level (5.2%) with regard to other means of transportation is smaller because a relatively large number of those interviewed travelled by bicycle to reach the latter.

In order to determine which centers deviate from the central place characteristics, Discriminant Analysis was used and according to Appendix B(1), Yorktown, Dougall/Cabana, Huron, Hampton/Rivard and Eastgate Plazas in the neighbourhood group were identified as being misclassified centers. The regional center was not included because of it being the only case in that group.

Among the neighbourhood centers, Yorktown Plaza has a high proportion (94%) of customers who drove. This may be because of the physical barrier created by the Grand Marais Drain as well as its trade area extending into a relatively high income, suburban area (South Windsor), where nearly all residents own one or more automobiles. Also, Yorktown is located on several busy streets and this might discourage pedestrian traffic. Its major tenant is a very successful N&D Supermarket and the average purchase is high, thereby encouraging the automobile mode. Huron, Hampton/Rivard and Eastgate Plazas also have a high proportion of customers who drove (88.0%, 83.0% and 83.0 respectively), due to their being located on major arteries (see fig. 10, Traffic Flow Map). Dougall/Cabana is also misclassified because of the lower proportion (7.0%) of customers who walked. This is because the center is located at the edge of the residential area in an area of low population density, and the

incidence of transient or casual business is nigher than normal.

During the survey it was also observed that a majority of the neighbourhood centers' other means of transportation percentages were swelled by teenagers bicycling there for the entertainment of arcade and video games and to make small purchases of soft drinks, cigarettes, etc.

The evidence presented in table 11 and more especially from figure 18, leads to the conclusion that the proportion of customers who use the automobile is directly related to the center level while the proportion of pedestrians is inversely related. The hypothesis #7 that the proportion of shoppers who travelled by car to a center will decrease from higher order center to lower order center is therefore accepted.

4.3.2 FREQUENCY OF VISIT

Variations in trip frequency also emphasize differences in consumer behaviour among centers as well as between groups. According to the theory, higher order centers mainly deal with specialty goods such as clothing and household goods and are located farther apart, therefore customers are less willing to pay frequent visits to these centers. A generalization night encompass: the more important the process of goods selection, the longer the trip, and therefore, the less frequent the visit.

Table 12 shows the proportion of the shopping visits - weekly, monghly, occasionally and seldom - for all the shopping centers and figure 19 illustrates the same thing by different levels in the hierarchy. In contrast to the theory, the percentage (60) of weekly visits to those centers in the community group is higher than the proportion of weekly visits (57) to those in the neighbourhood group. Even the percen-

Table (12)

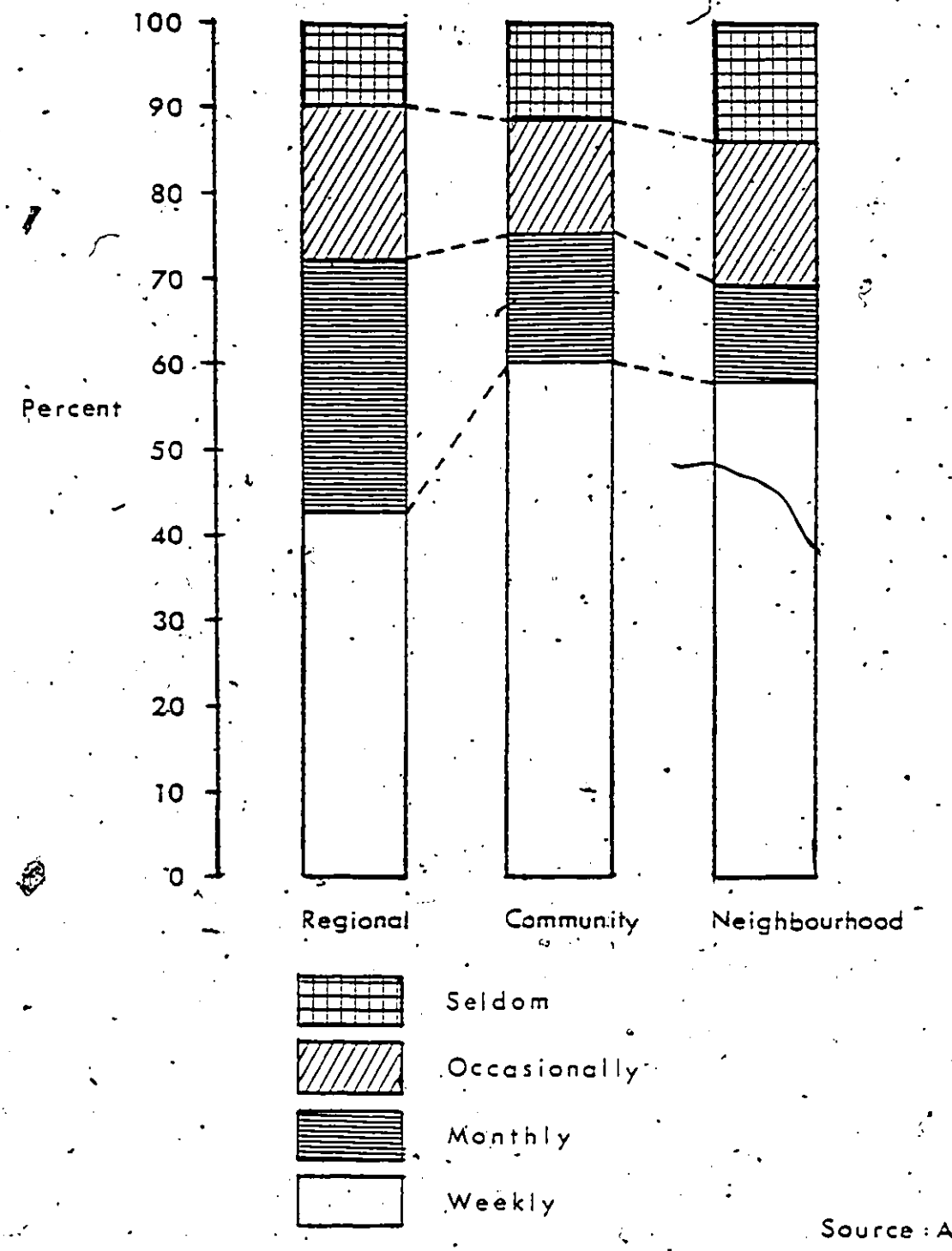
FREQUENCY OF VISITS BY SHOPPING CENTER LEVELS

ID #	CENTER	WEEKLY	MONTHLY	OCCASIONALLY	SELDOM
	Regional				
1.	Devonshire	43.0	29.0	18.0	10.0
	Community				
2.	Tecumseh	65.0	16.6	12.4	6.0
3.	Dorwin	66.0	13.0	9.0	12.0
4.	Eastown	71.0	8.0	15.0	6.0
5.	Gateway	61.7	13.7	10.4	14.2
6.	University	50.0	20.5	15.5	14.0
7.	Ambassador	48.8	13.7	21.8	15.7
	$\bar{x}$	60.4	14.3	14.0	11.3
	Neighbourhood				
8.	Yorktown	84.0	4.0	10.0	2.0
9.	Central	54.0	25.0	13.0	8.0
10.	Forest Glade	82.0	4.0	11.0	3.0
11.	Pickwick Place	50.0	10.0	24.0	16.0
12.	Village Market	81.0	2.0	13.0	4.0
13.	Jefferson	50.0	10.0	21.0	19.0
14.	Huron	29,0	8.0	24.0	39.0
15.	Gladeview	64.0	12.0	16.0	8.0
16.	Dougall/Cabana	49.0	15.0	16.0	20.0
17.	Lambton	37.0	23.0	13.0	27.0
18.	Hampton/Rivard	40.0	12.0	15.0	33.0
19.	Lauzon	81.0	5.0	13.0	1.0
20.	Eastgate	54.0	23.0	18.0	5.0
21.	Tecumseh/Howard	44.0	14.0	20.0	22.0
	$\bar{x}$	57.2	11.9	16.2	14.7

Source: Questionnaire

Figure 19

FREQUENCY OF VISIT BY SHOPPING CENTER LEVEL



Source : Author

hcd

tage of monthly visits in the community group is higher at 14% than that of the neighbourhood at 11.7%. It is interesting to note that the percentage of customers visiting seldom is inversely related to the shopping center size in the central places. On the regional level, central place characteristics exist as denoted by the frequency of visits because its percentage of weekly visits is lower (43%) and monthly and occasional visits are higher (29 and 18 percent respectively), compared with the other two levels.

The reason for a higher percentage of weekly visits in the community group is that all the centers in this group contain large supermarkets, whereas in the neighbourhood group, only Yorktown, Central, Forest Glade and Village Market have this facility.

Appendix B(2) (Discriminant Analysis), shows which of the centers do not display the central place characteristics in the community and neighbourhood groups. Due to the fact that Eastown has the major supermarket (N & D), more customers (71%) tend to visit weekly causing it to be classified in the neighbourhood group according to frequency of visits. Even though the percentage of weekly visitors is smaller for Ambassador Plaza (48.8%), it has also classified as a neighbourhood center. There are two possible reasons for this aberration. Firstly, in Windsor, the neighbourhood centers have a high proportion of customers (figure 19) who visit occasionally and seldom, and Ambassador Plaza, displaying this trait, has classified into that group. Secondly, the regional center was not included in this analysis but had it been, because of its lower percentage of weekly visitors (48.8%), this plaza would have classified into the regional group.

Twenty-eight percent of the centers (4/14) have been misclassified in the neighbourhood group, namely Yorktown, Lambton and Eastgate Plazas and Central Mall. Yorktown is misclassified because of the neighbourhood groups' low (59.6%) percentage of weekly visits. However, since this plaza has 84% of weekly customers, it truly represents the neighbourhood group. Because of the wide residential hinterland and large number of shopping goods, the percentage of monthly visitors increases and this is a higher order characteristic. Lambton, and Eastgate's percentages of monthly visitors, (23% each), are also high due to their being located on major arteries. Of notable interest is that all the centers which have a high percentage of "seldom" visitors (Pickwick - Tecumseh Road 16%, Jefferson - Tecumseh Road and Jefferson Avanue 19%, Huron - Huron Church Road 39%, Dougall/Cabana - Dougall Road and Cabana Avenue 27%, Tecumseh/Howard - Tecumseh Road and Howard Avanue 22%, are all located on major arteries and/or major intersections in the city, (see figure 10).

The large number of shopping goods shops in some of the neighbourhood centers such as Pickwick Place, Jefferson, Lambton, Hampton/Rivard and Tecumseh/Howard, also provides another reason for the percentage of occasional and seldom visits to increase and the number of weekly visits to decrease. It is noted that the above centers are heavily oriented to the traffic flow type of customers and less than normal, for this type of center, to neighbourhood sources of business.

Since the percentage of selfom visitors is inversely related to the shopping center level or size and the percentage of weekly and monthly visitors in the neighbourhood group, the hypothesis (#8) that the

higher the order of a center in a hierarchy, the less frequently it it visited is rejected.

4.3.3 MAJOR PURPOSE OF THE VISIT

Since the higher level centers have more shopping good functions, it is expected that the consumers who come to purchase these goods should be in a higher proportion. Table 13 shows in detail the major purpose of visits by individual centers and figure 20 illustrates the trend of major purpose of the visit by three levels of shopping centers. Both table and figure indicate clearly that the percentage of the visits for shopping goods is directly related to the center size in central places while the percentage of visits for convenience goods is inversely related.

At the regional level, 44% of the customers interviewed came mainly for shopping goods. However, there was not much difference between apparel goods visitors (21%) and other shopping goods (23%). At the community level, only 26.3% of the customers interviewed and 15.3% at the neighbourhood level came mainly for shopping goods. As at the regional level, a high proportion of customers came for other shopping goods rather than for apparel while on the community level their main purpose was for apparel goods. This is mainly because of Tecumseh Mall (26%) and Gateway Plaza (18%) having more apparel shops. Only 56% of the customers at the regional center came to it mainly for convenience goods whereas this figure increases to as high as 73.7% at the community level and to 84.7% at the neighbourhood level. This evidence supports the hypothesis that the percentage of shoppers for convenience goods increases from higher order to lower order whereas the percentage of customers for shopping goods decrea-

Table (13)

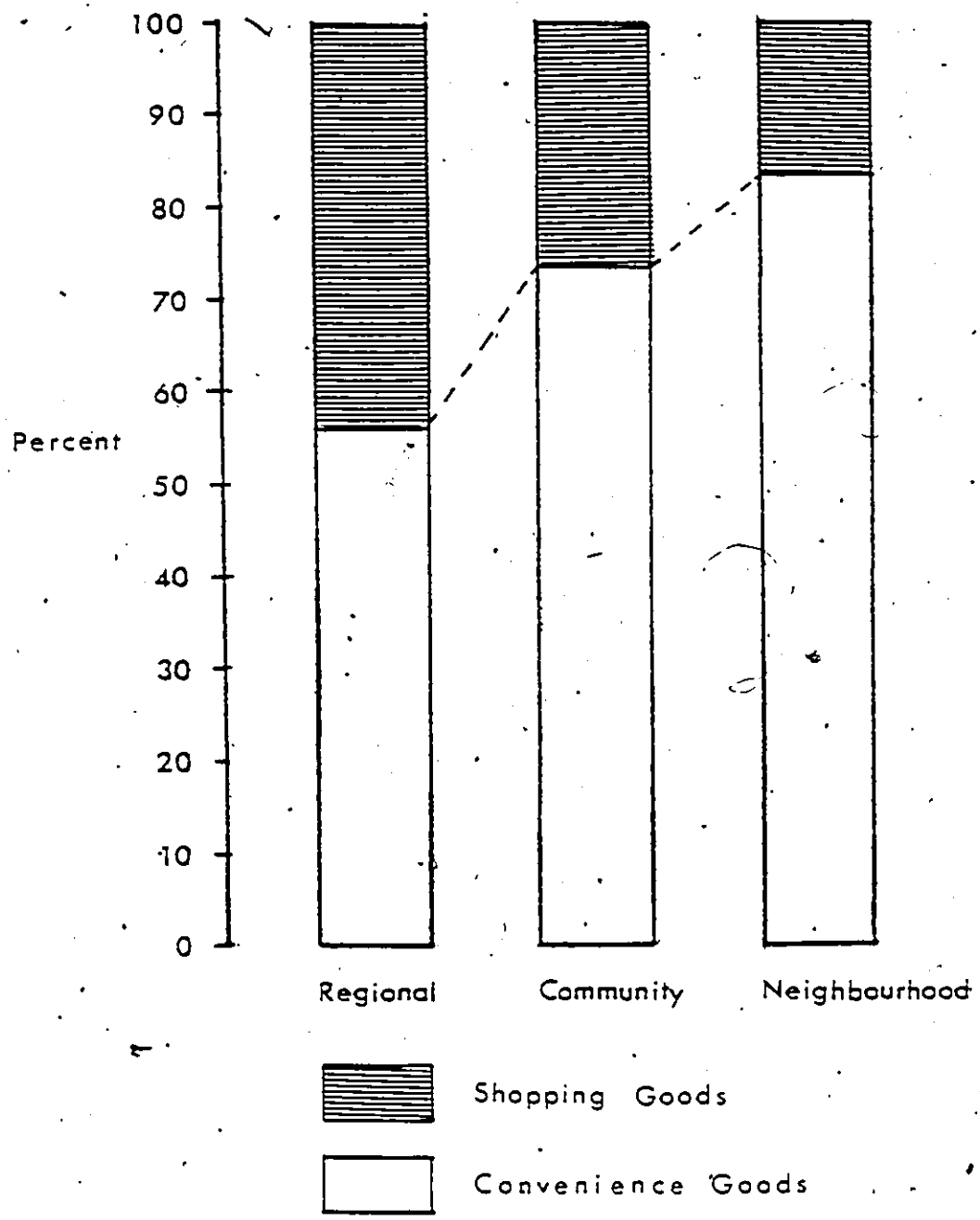
MAJOR PURPOSE OF THE VISIT BY SHOPPING CENTER LEVELS

ID.#	CENTER	Convenience Goods				Shopping Goods		
		FOOD	DRUGS	OTHER	TOTAL	APPAREL	OTHER S. GOODS	TOTAL
	Regional							
1.	Devonshire	38.0	6.0	12.0	56.0	21.0	24.0	44.0
	Community							
2.	Tecumseh	38.0	2.0	23.5	63.5	26.0	10.5	36.5
3.	Dorwin	49.0	2.0	28.0	79.0	10.0	11.0	21.0
4.	Eastown	53.0	- -	15.0	68.0	10.0	22.0	32.0
5.	Gateway	52.8	2.2	23.5	78.5	12.3	9.2	21.5
6.	University	51.0	13.0	15.0	79.0	9.0	12.0	21.0
7.	Ambassador	49.0	3.0	22.0	74.0	14.0	12.0	26.0
	$\bar{x}$	48.8	3.7	21.2	73.7	13.5	12.8	26.3
	Neighbourhood							
8.	Yorktown	76.0	4.0	11.0	91.0	- -	9.0	9.0
9.	Central	69.0	5.0	15.0	89.0	3.0	8.0	11.0
10.	Forest Glade	69.0	6.0	21.0	96.0	1.0	3.0	4.0
11.	Pickwick Place	9.0	12.0	40.0	61.0	26.0	13.0	39.0
12.	Village Market	67.0	9.0	20.0	96.0	- -	4.0	4.0
13.	Jefferson	26.5	- -	52.0	78.5	8.4	13.1	21.5
14.	Huron	41.3	- -	32.5	73.8	11.0	15.0	26.2
15.	Gladeview	68.0	- -	28.0	96.0	4.0	- -	4.0
16.	Dougall/Cabana	18.0	11.2	35.0	64.2	5.0	30.8	35.8
17.	Lambton	30.0	- -	45.0	75.0	- -	25.0	25.0
18.	Hampton/Rivard	10.0	- -	66.6	86.6	- -	13.4	13.4
19.	Lauzon	39.0	- -	52.0	91.0	- -	9.0	9.0
20.	Eastgate	67.5	- -	32.5	100.0	- -	- -	- -
21.	Tecumseh/Howard	34.0	- -	54.0	88.0	- -	12.0	12.0
	$\bar{x}$	45.3	3.4	36.0	84.7	4.2	11.1	15.3

Source: Questionnaire

Figure 20

MAJOR PURPOSE OF THE VISIT BY SHOPPING CENTER LEVEL



Source : Author

ses, and the hypothesis (#9) is accepted.

Although differences exist among shopping center levels in the major purpose of the visit, the variance between the neighbourhood and the community levels is less than that between the community and the regional levels. This is because 35.7% of the centers (5/14) do not have lower order central place characteristics by means of major purpose of visit. According to table 21, Pickwick Place, Jefferson, Huron, Dougall/Cabana and Lambton Plazas among the neighbourhood centers, have community shopping center level characteristics because all of these centers contain a high percentage of shopping good shops. Twenty-six percent of the customers interviewed at Pickwick Place came to shop for apparel goods. The Canadian Trading Post at Lambton, Radio Shack, a wallpaper store and a drug store at Dougall/Cabana, a china and ceramics shop at Huron, a dry goods and fabrics shop at Jefferson - all shopping goods shops - drew higher percentages of customers to the Plazas where they are located - 25.0%, 30.8%, 15.0% and 13.1% respectively.

All the large neighbourhood centers have capacious supermarkets (with the exception of Pickwick Plaza), and therefore draw a higher percentage of customers for food stuffs and other groceries among convenience goods. The I. G. A. supermarkets in Village Market and Eastgate Plazas and Farmer Clyde's in Gladeview Plaza also drew a high percentage of customers for food and produce. At both the community and regional levels, the percentage of customers visiting for the purchase of food is higher among the convenience goods.

4.3.4 TYPE OF SHOPPERS

Consumers will go on foot to nearby neighbourhood centers to pur-

chase convenience or day-to-day goods such as bread, milk, cigarettes, newspapers or other small, easily carried items. There is usually less need, therefore, for more than one person to go along or to use any other method of transportation to reach these lower order centers except when a mother, parent or other family member might take a child along rather than leave him/her alone at home.

Table 14 and figure 21 show the proportion of type of shoppers by individual store and by different shopping center level in the hierarchy. Seventy-five percent of the customers interviewed at the neighbourhood level were single shoppers. This proportion decreased somewhat (to 71.4%) at the community level and at the regional level there were only 55.8%, which is indicative of the central place characteristics. The proportion of families who came to these centers increases from 13.8% at the neighbourhood level to 15.4% at the community level and 26.6% at the regional level.

Since the proportion of family customers and couples is directly related to the shopping center size, the hypothesis (#10) that the percentage of single shoppers decreases from the lower order to the higher order centers, whereas the percentage of couples and families increases is accepted.

However, there are exceptions such as Pickwick Place, Forest Glade, Eastgate, Huron and Gladeview centers on the neighbourhood level, which have a higher proportion of family customers. Here a parent of either sex accompanied by a child was considered as a family. (Forest Glade Plaza is situated in a highly residential area so it is to be expected that a single parent will take a small child on such a shopping

Table (14)

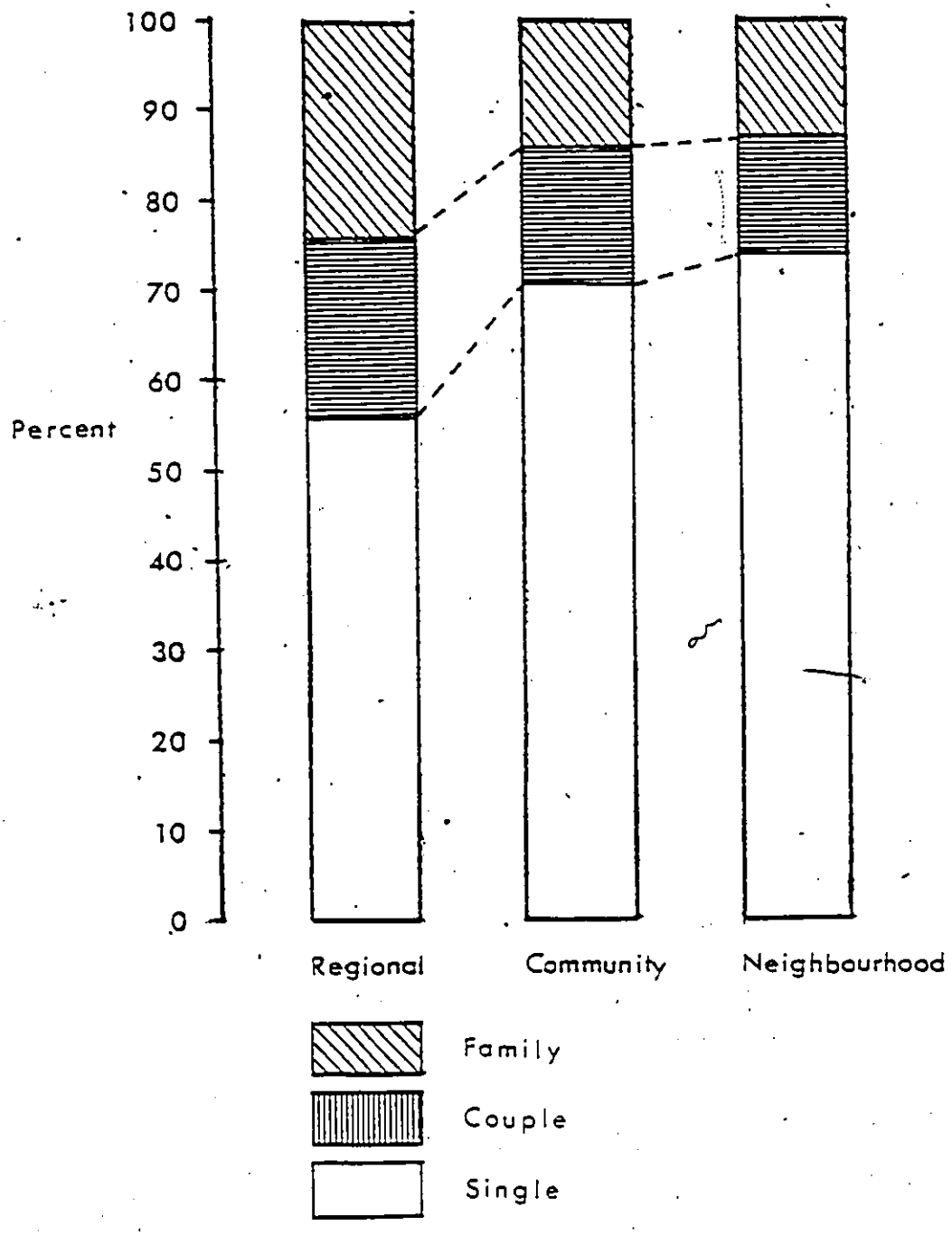
TYPE OF SHOPPERS by SHOPPING CENTER LEVELS

ID #	CENTER	SINGLE	COUPLE	FAMILY
	Regional			
1.	Devonshire	55.8	18.6	25.6
	Community			
2.	Tecumseh	60.5	15.0	24.5
3.	Dorwin	76.0	7.8	16.2
4.	Eastown	56.0	18.5	25.5
5.	Gateway	76.3	15.8	7.9
6.	University	76.0	16.0	8.0
7.	Ambassador	84.1	7.3	8.6
	$\bar{x}$	71.4	13.5	15.4
	Neighbourhood			
8.	Yorktown	82.0	10.0	8.0
9.	Central	69.0	15.0	16.0
10.	Forest Glade	67.0	13.0	20.0
11.	Pickwick Place	62.0	13.0	25.0
12.	Village Market	77.0	16.0	7.0
13.	Jefferson	85.0	6.0	9.0
14.	Huron	68.0	12.0	20.0
15.	Gladeview	74.0	9.0	17.0
16.	Dougall/cabana	90.0	7.0	3.0
17.	Lambton	72.0	15.0	13.0
18.	Hampton/Rivard	73.0	12.0	15.0
19.	Lauzon	93.0	2.0	5.0
20.	Eastgate	69.0	11.0	20.0
21.	Tecumseh/Howard	71.0	14.0	15.0
	$\bar{x}$	75.1	11.1	13.8

Source: Questionnaire.

Figure 21

TYPE OF SHOPPERS BY SHOPPING CENTER LEVEL



Source : Author

trip for safety's sake. It was generally observed throughout the survey that this kind of family shopping was more often to be found at the major supermarkets and apparel stores. Pickwick Place has an exceptionally high number (7) of apparel stores which might be the reason for there being a high proportion (25%) of family customers shopping at that center.

Eastgate with Valdi's and Gladeview with Farmer's Pride and three eating shops (a restaurant, a donut/coffee shop and an ice cream parlour), draw a large number of family customers on the neighbourhood level. Restaurants, along with a china and gift shop attract local and tourist families to shop at Huron Plaza.

On the community level, Gateway, University and Ambassador centers have a small proportion ($\bar{x}$ = 8.1%) of family customers in comparison with other large centers - Dorwin, Tecumseh and Eastown ($\bar{x}$ = 22.0%). Interestingly, 84% of the customers visiting Ambassador Plaza, a community level center, identified as "single". This is a neighbourhood level characteristic. Also, with the exception of Ambassador and Dorwin Plazas, all the other community level centers have a relatively high proportion of customers listed as single.

Chapter V

CONCLUSION

The main purposes of this study were: first, to group the Planned Shopping Centers of the City of Windsor from lower level to higher level; second, to analyse the trade area characteristics as well as the structure of the functional units and consumer behaviour at those classified levels in order to determine the power of attraction of those levels and to learn what central place characteristics exist in those classified levels. The Central Place Concept was used throughout.

5.1 Classification of Shopping Centers

The functional hierarchy of the Planned Shopping Centers in Windsor was the primary concern of this study. Of the four major criteria - population served, gross floor area, site area and major tenant - population served was the foremost criterion used.

Three groups of Planned Centers were identified by means of the scatter diagram from the data of all four criteria collected by means of the questionnaire survey and secondary sources. These were labeled Groups "A", "B" and "C". The Urban Land Institute Classification Code System was also used as a control test against the findings of the scatter diagram and identical patterns of groupings resulted. The three groups and the shopping centers contained within them were named and code numbered as follows:

Group A - Regional Center - 1. Devonshire Mall

Group B - Community Centers - 2. Tecumseh Mall, 3. Dorwin Plaza, 4. Eas-

town Plaza, 5. Gateway Plaza, 6. University Mall, 7. Ambassador Plaza.

Group C - Neighbourhood Centers - 8. Yorktown Plaza, 9. Central Mall, 10. Forest Glade Plaza, 11. Pickwick Place Plaza, 12. Village Market Plaza, 13. Jefferson Plaza, 14. Huron Plaza, 15. Gladeview Plaza, 16. Dougall/Cabana Plaza, 17. Lambton Plaza, 18. Hampton/Rivard Plaza, 19. Lauzon Plaza, 20. Eastgate Plaza, 21. Tecumseh/Howard Plaza.

In B Group, Dorwin Plaza and Tecumseh Mall were identified as being large community centers and in C Group, Forest Glade, Yorktown, Pickwick Place Plazas and Central Mall were identified as being large neighbourhood centers. Two other centers, Jackson and Market Place Plazas (#'s 22 and 23), were not studied because they either did not have the minimum number of stores and/or a convenience type store typical of planned neighbourhood centers. Sub-groups were of little importance within the context of this study.

It was found that the Planned Shopping Centers in Windsor (on the whole), meet the following criteria:

Neighbourhood Centers contain a convenience type store as major tenant, have an average gross floor area of 32,510 s.f. on 2.4 acres and serve an average of 8,675 persons.

Community Centers contain one department store as a major tenant with an average gross floor area of 189,833 s.f., a 17.7 acre site, serving a population of 41,466 persons.

Regional Center houses three major department stores, has 907,415 s.f. gross floor area on a 60 acre site area, serving a population of 159,250. Since there is only one center at the regional level, no mean figures are available.

The power of attraction of the above shopping center groups was analysed by the testing of ten hypotheses using central place theory.

5.2 Trade Area and the Functional Structure Characteristics

5.2.1 Trade Area Characteristics

Since the number and the variety of goods and services are greater at the larger centers or at the higher levels of the shopping centers, the trade area size also tends to be bigger at this order. The trade area tests show that their sizes are correlated ($r = 0.99\%$) with the planned centers' sizes at a highly significant 99.9% probability level. (Population size was deemed to be equated with center size). The regional center's trade area displays a wide difference at 32 square miles from the mean size of the community group at $\bar{x} = 6.2$ s.m. and the latter differs significantly from the mean size of the neighbourhood centers at 1.3 s.m. The hypothesis (#1) that "higher order shopping centers have larger trade areas than centers at lower levels in the hierarchy" is accepted because of the significant correlation and the significant difference between the groups of centers.

The shapes of the trade areas were also studied and 35.7% of those of the neighbourhood centers were found to be circular, 28.5% ovoid or peariform and another 28.5% linear. The shapes of all the large centers (regional and community), are stellate or irregular. The physical geography of the city itself, street patterns, large expanses of vacant property, barriers produced by railroads, industrial districts, cemeteries, parks and other land uses and the pattern of the historical development are among the reasons for the occurrence of this phenomenon.

Finally, these studies also revealed that a nesting of trade areas occurs in the hierarchy of planned shopping centers. The trade areas of all neighbourhood centers nested into one or another of the community centers and with few exceptions, trade areas of both neighbourhood and community centers all nest into that of the regional center.

5.2.2 Trade Area Population

The study disclosed that 75% of the total trade area population lives within the first mile of the neighbourhood centers. This percentage figure dropped to 35% for community centers and to 4% for the regional center. These findings support hypothesis (#2) "trade area population density within one mile for small centers is greater than that of the next order shopping centers". The customer concentration of the neighbourhood shopping centers peaks within a one-half mile radius with 57% of the total trade area population coming from this area. The customer concentration of the community centers peaks in the 1 - 1½ mile zone from the center. Approximately 35.7% of the customers come from this zone. For the regional shopping center, the highest percentage (23.9%) of the customers originate in the 3 - 3½ mile radius. This indicates the changing power of attraction in the distribution of the population for the three types of centers in the hierarchy.

5.2.3 Customer Location or Distances Travelled

The third hypothesis states that the majority of customers are from within a half mile radius at the lowest (neighbourhood) level of the hierarchy and from farther away at the highest (regional) level. The fin-

dings of this study show that 39.4% of the customers interviewed at the neighbourhood shopping centers, 10.9% at the community level and 0.0% at the regional level, live within the first ½ mile zone. The highest percentage of customers come to the neighbourhood centers from within the first ½ mile zone and from between ½ to 1 miles to the community centers whereas to the regional center, the highest percentage come from within the 4 - 4½ mile radius. This again illustrates the power of attraction of different levels of shopping centers clearly.

Thus far, statistically, the plausibility of the hypothesis holds and the above mentioned regularity indicates the existence of central place characteristics in terms of customer location. However, some discrepancies, such as the overlapping of trade areas of some community and neighbourhood centers occurred. Also, distances travelled to some centers classified as neighbourhood equalled or exceeded some of those travelled to community centers. Several reasons have been given in the analysis chapter for different centers but the main reason was that Windsor is a medium size city and good transportation facilities enable customers to reach any part of the city with reasonable ease. The existence of a special service or shopping goods store in a smaller center may bring customers from a considerable distance.

5.2.4 Type of Functions or Shops

According to theory, the proportions of convenience goods at the lower level and shopping goods at the higher level should be greater, (Hypothesis #4). The high correlation coefficient ($r = +0.91$) proves that the number of shopping good shops is highly correlated with the shopping center size whereas all the convenience goods and services shops only ac-

count for 18.7% at the regional level. This proportion changes to 40.4%, 30% and 25.0%, 25.8% at community and neighbourhood levels respectively. This shows the prominence of shopping goods shops at the higher level of the hierarchy.

It was also found that hair-styling shops and convenience stores, at the neighbourhood level and department stores, supermarkets and banks at the community level are predominant functions. Representative basic functions at each level were also studied and it was determined that of these, none of the basic functions were represented at the neighbourhood level while three out of eight functions were to be found at the community level. This neighbourhood characteristic indicates the complexity of the functions at the intra-urban hierarchical level and generally supports the findings of Garner's Chicago Study.

5.2.5 Floor Space

Garner, in his Chicago study (1966), postulated that since the number of shops devoted to shopping goods is greater at the higher level centers, the floor space devoted to these goods will be proportionately high.

Garner's study was conducted for the retail nucleations in a large metropolitan area. In this study it was decided to test his theory against the planned shopping centers in a medium sized city. Statistically, the results are similar to those arrived at by Garner and the hypothesis (#5) holds. The square footage of shopping goods floor space was found to be directly related (N = 19.3; C = 63.3; R = 84.4%) to the center levels while that of convenience goods is inversely related. However, it

is interesting to note that the proportion of floor space devoted to shopping goods in Windsor is greater at all levels than in Chicago (N-5; C-30; R-51%).

5.2.6 Distances Travelled for Shopping and Convenience Goods

At all levels in the hierarchy within the city, the total percentage of customers who visited centers to purchase shopping goods travelled longer distances than for convenience goods (hypothesis #6). At the community level the distance is almost double (1.2 miles) for shopping goods than that of the other two levels (0.7 miles). The attraction of low to moderate price image department stores such as K-Mart and Woolco is a probable explanation.

The average distances travelled for convenience goods and shopping goods also increases from lower level to higher levels, but statistical tests show that there is not a significant difference in distances travelled for community and neighbourhood center groups for convenience goods. The locations of some centers on major arteries leading in and out of the city play an important role in the distances travelled for convenience goods. Also, economic reasons have caused a change in the willingness of many customers to travel greater distances in order to take advantage of discount or sale pricing on goods which might otherwise be purchased closer to home at the neighbourhood level.

5.3.1 Mode of Transportation

The proportion of people who travelled bycar is directly related to center levels while the proportion of people who walked is inversely related. The proportion who walked to neighbourhood centers is twice as

large as the proportion who walked to community centers. Ninety percent of customers travelled by car to the regional center and this decreased to 87% and 76% at community and neighbourhood levels respectively. There was not a great deal of difference between regional and community centers, however. It was found that five of the fourteen neighbourhood centers deviate from their level characteristics with respect to mode of transportation. In other words, even though they fall into the neighbourhood group (according to the scatter diagram and classification code system, they all have a higher percentage of customers who came by car than would be expected. It should be noted that all of these centers are located on major arteries.

5.3.2 Frequency of Visit

In the regional level, central place characteristics exist by means of frequency of visits - that is a higher percentage of customers visited less frequently (hypothesis # 8). However, in the community group, the percentage of weekly and monthly visitors is higher than that of the neighbourhood group and this is a deviation from the central place characteristics. The consumer behaviour patterns among the planned centers in Windsor therefore, do not bear out the theory that higher order centers are less frequently visited than are those of the lower levels. The reason is that the frequency of visit tends to be more highly related to the components of a given center than to its size.

5.3.3 Major Purpose of the Visit

That the percentage of shoppers for convenience goods increases from higher level to lower level whereas it decreases for shopping goods (hypothesis #9), is supported by the evidence, because higher order cen-

ters have more shopping good functions. The variance between neighbourhood and community levels is smaller than that between community and regional levels. However, five of the neighbourhood centers, because they contain a high percentage of shopping good shops, display community level characteristics.

5.3.4 Type of Shoppers

The proportion of single shoppers decreases from neighbourhood centers to regional centers (N -75.1%, C -71.4%, R -55.8%) while the proportion of family shoppers increases from neighbourhood to regional centers (N -13.8%, C -15.4%, R -25.6%), and these percentage figures support the hypothesis #10. However, five centers at the neighbourhood level have a high proportion of family customers and therefore deviate from the central place characteristics or theory by means of type of shoppers. Supermarkets and apparel stores generally draw family customers at the lower level.

GENERAL CONCLUSIONS

Central Place theory has been developed by geographers to account for the regularity in the marketing functions performed by the central places of the areas served. The literature on this dubject has either stated or implied a hierarchy of shopping centers with a continuity or relatively smooth gradient of characteristics from one rank to another. From the foregoing summary of findings it is evident that there is a systematic change in the power of attraction among the planned shopping center groups in Windsor. However, this research indicates that there is not a smooth gradient, that is, while central place characteristics do

exist, some centers do not conform to type, or to all characteristics of their rank in the shopping center hierarchy. There are some centers from each level which deviate from the central place characteristics with respect to each of the variables studied. This research adds to the literature in that it points out reasons for deviations in shopping hierarchy for cities of the magnitude of Windsor, yet confirms the validity of the general shopping center hierarchy concept as tested by other writers.

5.4 Limitation of the Study

Every study must have certain limitations in some area and in this study the major limitation is the sample size. According to Applebaum (1968), one interview should be obtained for every $100.00 of weekly store sales (it is assumed that a store's sales are in proportion to the number of its customers). The preference of any researcher would be to obtain a larger sample which would be more truly representative. However, this study deals with all the planned centers in Windsor and each center contains a number of stores, therefore Applebaum's criterion was not used to determine the size of the sample. Arbitrary representative samples were used instead. The confidentiality of the sales data and the limits of the time and finances of the researcher also influenced the size of the sample taken.

Much of the center' individual store floor space data was obtained from the Devonshire Mall Company and the Metro Construction Company. However, there was difficulty in obtaining data regarding some of the cmaller centers because of the the owners or leasing tenants or leasing agents being located in Toronto and some of the local owners did not want to cooperate with the researcher in this regard. Therefore approximate

measurements were taken by pacing-off.

There were some comparisons made, to a certain extent, with Garner's 1966 Chicago Study. It should be noted , however, that the chronological gap and the differences in the field of research (unplanned vs planned centers), as well as the wide variance in the sizes of these two cities, limits the importance of the comparison.

5.4 Further Direction of Research

Since the present study deals only with planned shopping centers, it does not give the full or complete picture of Windsor's retailing system. A study of the unplanned centers conducted along similar lines using the same kinds of methods as presented in this paper, would illustrate more accurately the trade area patterns and the retailing system of the whole city. A comparison study with a more appropriately sized city (that is, other than Chicago), should be used.

At the present time there is a great deal of effort being made to revitalize Windsor's Central Business District, the main thrust being in the construction of a new, main street shopping mall, including plans for a new department store. In comparison studies it would be interesting to see how either the Devonshire Mall alone or/and the overall planned centers affect Downtown business through trade area as well as consumer behaviour studies.

It is hoped that the knowledge derived from the results of this study might provide useful insight for the future planning of housing and the provision of other services as well as be of use to those concerned with trends in the social, environmental and economic conditions in Windsor.

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Name:_____

Type:_____

COMMERCIAL INVENTORY CLASSIFICATION SHEET

(Refined to 4 digits from D.B.S. Standard Industrial Classification)

Food Stores
- 6310 Supermarkets
- 6311 Bake Shops
- 6312 Candy and confectionery stores
- 6313 Dairy products stores
- 6314 Delicatessen stores
- 6315 Fish markets
- 6316 Food stores, grocery & meat markets
- 6317 Fruit and vegetable markets
- 6318 Meat markets
- 6319 Food stores not elsewhere classified

General Merchandise Stores
- 6421 Department stores
- 6422 Mail order offices
- 6471 Discount stores
- 6472 Variety stores (chain)
- 6473 Variety stores
- 649- Other general merchandise stores not elsewhere classified

Retailers of Automotive Products
- 651- Automobile accessory, parts, tire & battery shops
- 654- Gasoline service stations
- 6561 Car washing and polishing
- 6562 Motor vehicle dealers (new and used)
- 6564 Motor vehicle dealers (used only)
- 6581 Auto body work and painting
- 6582 Auto electric and ignition repair
- 6584 General auto repair
- 6589 Auto repair not elsewhere classified

Clothing and Shoe Stores
- 6631 Children's shoe stores
- 6632 Family shoe stores
- 6633 Men's shoe stores
- 6634 Women's shoe stores
- 6651 Men's clothing stores
- 6652 Men's furnishings
- 6671 Women's ready-to-wear stores
- 6672 Millinery shops
- 6673 Foundation garments, lingerie & hosiery shops
- 6674 Furriers and fur stores
- 6691 Children's clothing stores
- 6692 Family clothing stores
- 6693 Second-hand clothing stores
- 669- Dry good stores
- 6699 Apparel & accessory shops not elsewhere classified

Hardware, Household Furniture & Appliance Stores
- 673- Hardware stores
- 674- Paint, glass, and wallpaper stores
- *6761 Antique shops
- 6762 Curtains and draperies
- 6763 Floor coverings
- 6764 Furniture stores
- 6765 Household appliance stores
- 6766 Radio & television stores
- 6767 Second-hand furniture
- 6769 Household furnishing stores not elsewhere classified
- 678- Radio, television, & electrical appliance repair shops

Other Retail Stores
- 681- Drug stores
- 6811 Book stores
- 6812 Stationery stores
- 682- Florists' shops
- 6831 Fuel oil & bottled gas dealers
- 6832 Other fuel dealers
- 684- Jewellery stores (incl. repairs)
- 6861 Beer stores
- 6862 Liquor stores
- 6863 Wine stores
- 687- Tobacconists
- 6881 Art galleries
- 6882 Bicycle shops
- 6883 Boats and marine supplies
- 6884 Cameras & photographic supplies
- 6885 Gift and novelty shops
- 6886 Hobby shops
- 6887 Luggage & leather goods stores
- 6888 Musical instruments stores
- 6889 Optical goods stores
- 6890 Pet stores
- 6891 Record shops
- 6892 Sporting goods dealers
- 6899 Retail stores not elsewhere classified

Finance, Insurance, and Real Estate
- 7021 Banks
- 7022 Finance and loan companies
- 7023 Mortgage companies
- 7024 Trust companies
- 7029 Savings and credit institutions not elsewhere classified
- 704- Investment companies & security dealers
- 731- Insurance agents and companies
- 735- Insurance and real estate agencies
- 737- Real estate operators

Community Services
- 8031 Commercial and business schools
- 8071 Libraries
- 809- Education & related services not elsewhere classified
- 811- Hospitals
- 813- Offices of physicians
- 815- Offices of dentists
- 8171 Offices of chiropractors
- 8173 Health & Welfare organizations
- 8175 Medical and dental laboratories
- 8274 Optometrists
- 8279 Health services not elsewhere classified
- 831- Religious organizations
- 851- Motion picture theatres
- 853- Bowling alleys and billiard parlours
- 858- Recreational facilities not elsewhere classified

Services to Business Management
- 861- Accountancy services
- 862- Advertising services
- 866- Engineering & scientific services
- 866- Legal services
- 8691 Blueprinting & duplicating services
- 8693 Employment agencies (not government)
- 8699 Business services not elsewhere classified

Personal Services
- 871- Shoe repair shops
- 8731 Barber shops
- 8732 Beauty shops
- 8741 Cleaning, dyeing and pressing
- 8742 Laundering service
- 8743 Laundromats
- 8744 Linen and uniform supply services
- 8745 Rug and carpet cleaning
- 8751 Taverns
- 8752 Restaurants
- 8753 Restaurants, drive-in
- 8754 Hotel, motor hotel
- 8755 Motel, motor court, tourist cabins
- 8756 Trailer courts and parks
- 876- Lodging houses & residential clubs
- 877- Funeral directors
- 8781 Clothing rental
- 8782 Dressmaking
- 8789 Personal services not elsewhere classified

Miscellaneous Services
- 811- Labour organizations & trade associations
- 813- Photography
- 816- Machinsmithing & welding shops
- 816- Repair shops not elsewhere classified
- 817- Services to buildings & dwellings
- 8591 Fraternal organizations
- 8592 Political organizations
- 8593 Automobile rentals
- 8594 Equipment rentals
- 8599 Miscellaneous services

- V Vacant commercial structures
- D Deteriorated commercial structures
- NC New commercial construction not ready for occupancy
- C Conversions of commercial structures to non-commercial uses
- R Residential units
- VR Vacant residential units in commercial structures
- Vac Vacant land

SUMMARY FOR SHOPPING CENTERS & RIBBONS

	Ground Floor	Upper Floors	Total
No. of establishments			
No. of functions			
Vacancies			
Deteriorations			
Conversions to non-commercial uses			
Residential uses			

COMMENTS:

DISCRIMINANT ANALYSIS

POSTERIOR PROBABILITY OF MEMBERSHIP IN X1:

1. Mode of Transportation

OBS	FROM X1	CLASSIFIED INTO X1		2	3
1				0.6847	0.3153
2				0.7917	0.2083
3				0.7909	0.2091
4				0.7959	0.2041
5				0.7259	0.2741
6				0.7587	0.2413
7				0.2965	0.7035
8				0.1250	0.8750
9			*	0.7300	0.2700
10			*	0.7387	0.2613
11				0.1160	0.8840
12				0.1651	0.8349
13				0.4198	0.5802
14			*	0.5453	0.4547
15				0.0492	0.9508
16				0.1971	0.8029
17			*	0.5768	0.4232
18			*	0.6520	0.3480
19				0.3634	0.6366
20				0.2495	0.7505

2. Frequency of Visit

OBS	FROM X1	CLASSIFIED INTO X1		2	3
1				0.6453	0.3547
2				0.6317	0.3683
3			*	0.4594	0.5406
4				0.6027	0.3973
5				0.6004	0.3996
6			*	0.3553	0.6447
7			*	0.5254	0.4746
8				0.7385	0.2615
9				0.4987	0.5013
10				0.2645	0.7355
11				0.4198	0.5802
12				0.3042	0.6958
13				0.1636	0.8364
14				0.4898	0.5102
15				0.4861	0.5139
16			*	0.6235	0.3765
17				0.3881	0.6119
18				0.4818	0.5182
19			*	0.6313	0.3687
20				0.3648	0.6352

3. Major Purpose of Visit

OBS	FROM X1	CLASSIFIED INTO X1		2	3
1				0.8062	0.1938
2				0.5049	0.4951
3				0.7345	0.2655
4				0.5004	0.4996
5				0.5049	0.4951
6				0.6161	0.3839
7				0.2556	0.7444
8				0.2916	0.7084
9				0.1791	0.8209
10			*	0.8392	0.1608
11				0.1791	0.8209
12			*	0.5162	0.4838
13			*	0.6204	0.3796
14				0.1791	0.8209
15			*	0.7961	0.2039
16			*	0.5945	0.4055
17				0.3385	0.6615
18				0.2556	0.7444
19				0.1425	0.8575
20				0.3107	0.6893

4. Type of Shoppers

OBS	FROM X1	CLASSIFIED INTO X1		2	3
1				0.5690	0.4310
2				0.6509	0.3491
3				0.6784	0.3216
4				0.6344	0.3656
5				0.6405	0.3595
6			*	0.3502	0.6498
7			*	0.4396	0.5604
8			*	0.5887	0.4113
9			*	0.5114	0.4886
10			*	0.4998	0.5002
11			*	0.6424	0.3576
12				0.3196	0.6804
13				0.4890	0.5110
14				0.3322	0.6678
15				0.6659	0.3341
16			*	0.5959	0.4041
17				0.4913	0.5087
18				0.2130	0.7870
19			*	0.4505	0.5495
20			*	0.5795	0.4205

2 = Community Group

3 = Neighbourhood Group

* = Deviation from Central Place Characteristics

Regional Group Not Included

QUESTIONNAIRE

1. How did you arrive at the centre today?
_____Drive _____Walk _____Other

2. How often do you shop here?
_____Weekly _____Monthly ____Occasionally ____Seldom

3. What proportion of your total shopping is accomplished here?
__0-10 __11-30 __31-50 __51-75 __76 plus

4. What was the major purpose(s) of your shopping trip here?
_____food ____drugs ____other conveniences _____apparel
_____other shopping goods.

5. Is this your primary shopping area? __yes __no.
At what other centres or stores do you frequently shop?
_____

6. How far do you come to shop here? _____miles.

7. Would you mind giving your approximate address?
The block and street name will be adequate._____

Note: ___F ___M ___Couple __Family

Age Groups __Child __Teen __21-30 __31-40__41-54__55 plus

QUESTIONNAIRE

1. How did you arrive at the centre today?
_____Drive _____Walk _____Other

2. How often do you shop here?
_____Weekly _____Monthly ____Occasionally ____Seldom

3. What proportion of your total shopping is accomplished here?
__0-10 __11-30 __31-50 __51-75 __76 plus

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_____other shopping goods.

5. Is this your primary shopping area? __yes __no.
At what other centres or stores do you frequently shop?
_____

6. How far do you come to shop here? _____miles.

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The block and street name will be adequate._____

Note: ___F ___M ___Couple __Family

Age Groups __Child __Teen __21-30 __31-40__41-54 __55 plus

VITA AUCTORIS

Name:	Hector Charles Devasagayam
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