This dissertation has been
microfilmed exactly as received 68-8891

WAGNER, William Burdette, 1941-
AN EMPIRICAL TEST OF REILLY'S LAW OF
RETAIL GRAVITATION.

The Ohio State University, Ph.D., 1967
Business Administration

University Microfilms, Inc., Ann Arbor, Michigan

AN EMPIRICAL TEST OF REILLY'S LAW OF
RETAIL GRAVITATION

DISSERTATION

Presented in Partial Fulfillment of the Requirements
for the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

William Burdette Wagner, B.A., M.B.A.

The Ohio State University
1967

Approved by

Adviser
Department of
Business Organization

ACKNOWLEDGMENTS

I wish to express my sincere appreciation to the members of my committee, consisting of Drs. Fred E. Kindig, Chairman, Alvin E. Coons, and Reginald G. Golledge, for their valuable guidance and counsel in the preparation of this dissertation.

It is also my desire to thank Drs. James H. Davis, Jimmie L. Heskett, and William M. Morgenroth for their personal assistance and encouragement at various stages of the research.

In addition, Mrs. Roy Sheumaker should be commended for her effort in editing as well as typing the manuscript.

VITA

April 27, 1941	Born - Oswego, New York
1963	B. A. (High Honor), Michigan State University East Lansing, Michigan
1963-1966 . . .	NDEA Fellow, Business Logistics, The Ohio State University, Columbus, Ohio
1963	Research Assistant, The Ohio State University Columbus, Ohio
1965	M. B. A., The Ohio State University, Columbus, Ohio
1966	Instructor, The Ohio State University Columbus, Ohio

PUBLICATIONS

"An Empirical Test of Reilly's Law of Retail Gravitation," M. B. A.
thesis, The Ohio State University, 1965.

FIELDS OF STUDY

Major Field: Business Organization

Studies in Logistics, Professor Fred E. Kindig

Studies in Economics, Professors Alvin E. Coons and
Robert D. Patton

Studies in Management, Professor Ralph C. Davis

Studies in Personnel, Professor Michael J. Jucius

CONTENTS

	Page
ACKNOWLEDGMENTS	ii
VITA	iii
TABLES	ix
ILLUSTRATIONS	xiv
Chapter	
I. INTRODUCTION	1
Objectives	
Hypotheses of the study	
II. BACKGROUND.	5
The role and relevance of classical location theory to trading area analysis	
Overview	
Plant location analysis	
Trading area analysis	
Alternative approaches for determining retail trading areas	
Tests of Reilly's Law	
Justification for the study	
III. METHODS	30
Sample design	
Respondent characteristics	

	Age	
	Incomes	
	Occupation	
	Questionnaire construction and interviewing	
	Limitations	
IV.	FINDINGS FOR MARCH, 1964 STUDY (Sample A and Sample B)	51
	Key to analyses	
	Findings for specific goods and services:	
	Group I	
	General discussion of Group I	
	Locus of haircuts	
	Locus of medical services	
	Locus of Christmas shopping	
	Locus of grocery shopping	
	Locus of dress clothes purchases	
	Locus of work and school clothes purchases	
	Findings for specific goods and services:	
	Group II	
	General discussion of Group II	
	Locus of television set purchases	
	Locus of washer purchases	
	Locus of automobile purchases	
	Findings for specific goods and services:	
	Group III	
	General discussion of Group III	
	Locus of motion pictures	
	Locus of sporting events	
	Locus of music events	
	Locus of restaurants	

Chapter	Page
A statistical analysis of the 1964 study	
General discussion	
Test I	
Test II	
Findings for specific advertising media	
Locus of newspapers	
Locus of television viewing	
Locus of radio listening	
Relationships between advertising media and the purchase of goods and services	
Newspapers	
Radio	
Television	
V. FINDINGS FOR JULY, 1967 STUDY (Sample AA and Sample BB)	110
Key to analyses	
Findings for specific goods and services:	
Group I	
General discussion of Group I	
Locus of haircuts	
Locus of medical services	
Locus of Christmas shopping	
Locus of grocery shopping	
Locus of dress clothes purchases	
Locus of work and school clothes purchases	
Findings for specific goods and services:	
Group II	
General discussion of Group II	
Locus of television set purchases	
Locus of washer purchases	
Locus of automobile purchases	

Findings for specific goods and services:
Group III

General discussion of Group III
Locus of motion pictures
Locus of sporting events
Locus of music events
Locus of restaurants

A statistical analysis of the 1967 study

General discussion
Test III
Test IV

Findings for specific advertising media

Locus of newspapers
Locus of radio listening
Locus of television viewing

Relationships between advertising media and
the purchasing of goods and services

Newspapers
Radio
Television

VI. STATISTICAL ANALYSIS OF 1964 AND 1967
STUDIES 171

General discussion
Tests for Samples A and AA

First test for Samples A and AA:
Springfield responses
Second test for Samples A and AA:
Columbus responses

Tests for Samples B and BB

First test for Samples B and BB:
Springfield responses

Chapter		Page
	Second test for Samples B and BB: Columbus responses	
VII.	SUMMARY AND CONCLUSIONS	187
	Conclusions regarding goods and services	
	Conclusions regarding the relationship between advertising media and the pur- chasing of goods and services	
Appendix		
I.	DATA RELATED TO SAMPLE A RESPONDENTS	199
II.	DATA RELATED TO SAMPLE B RESPONDENTS	220
III.	DATA RELATED TO SAMPLE AA RESPONDENTS	241
IV.	DATA RELATED TO SAMPLE BB RESPONDENTS	262
V.	STATISTICAL SUMMARY OF RESULTS OF MARCH, 1964 STUDY	283
VI.	STATISTICAL SUMMARY OF RESULTS OF JULY, 1967 STUDY	288
VII.	SAMPLE COPY OF QUESTIONNAIRE UTILIZED IN THE STUDY	293
VIII.	BREAKING POINT FORMULA DERIVATION	296
	BIBLIOGRAPHY	299

TABLES

Table		Page
1.	Locus of Haircut Purchases, Absolute Values	54
2.	Locus of Haircut Purchases, Percentages	55
3.	Locus of Medical Services, Absolute Values	56
4.	Locus of Medical Services, Percentages	57
5.	Locus of Christmas Shopping, Absolute Values	59
6.	Locus of Christmas Shopping, Percentages	60
7.	Locus of Grocery Shopping, Absolute Values	63
8.	Locus of Grocery Shopping, Percentages	64
9.	Locus of Dress Clothes Purchases, Absolute Values	66
10.	Locus of Dress Clothes Purchases, Percentages . . .	67
11.	Locus of Work and School Clothes Purchases, Absolute Values	68
12.	Locus of Work and School Clothes Purchases, Percentages	69
13.	Locus of Television Set Purchases, Absolute Values	71
14.	Locus of Television Set Purchases, Percentages . . .	72
15.	Locus of Washer Purchases, Absolute Values	74
16.	Locus of Washer Purchases, Percentages	75

Table		Page
17.	Locus of Automobile Purchases	76
18.	Locus of Motion Pictures, Absolute Values.	79
19.	Locus of Motion Pictures, Percentages	80
20.	Locus of Sporting Events, Absolute Values	81
21.	Locus of Sporting Events, Percentages	82
22.	Locus of Music Events, Absolute Values	83
23.	Locus of Music Events, Percentages	84
24.	Locus of Restaurants, Absolute Values	85
25.	Locus of Restaurants, Percentages	86
26.	Place and Type of Purchase Observed and Expected Frequencies (Sample A)	90
27.	Determination of Total Group I, II, and III Responses for Sample A (1964).	92
28.	Place and Type of Purchase: Observed and Expected Frequencies (Sample B)	94
29.	Determination of Total Group I, II, and III Responses for Sample B (1964).	97
30.	Locus of Newspaper Subscriptions in Sample A . . .	98
31.	Locus of Newspaper Subscriptions in Sample A . . .	99
32.	Locus of Television Viewing in Sample A	100
33.	Locus of Television Viewing in Sample B	101
34.	Locus of Radio Listening in Sample A	102
35.	Locus of Radio Listening in Sample B	103

Table		Page
36.	Locus of Shopping Habits for Particular Goods and Services	105
37.	Locus of Newspaper Subscriptions.	106
38.	Locus of Haircut Purchases, Absolute Values	114
39.	Locus of Haircut Purchases, Percentages	115
40.	Locus of Medical Services, Absolute Values	117
41.	Locus of Medical Services, Percentages	118
42.	Locus of Christmas Shopping, Absolute Values	120
43.	Locus of Christmas Shopping, Percentages	121
44.	Locus of Grocery Shopping, Absolute Values	123
45.	Locus of Grocery Shopping, Percentages	124
46.	Locus of Dress Clothes Purchases, Absolute Values	126
47.	Locus of Dress Clothes Purchases, Percentages	127
48.	Locus of Work and School Clothes Purchases, Absolute Values	128
49.	Locus of Work and School Clothes Purchases, Percentages	129
50.	Locus of Television Set Purchases, Absolute Values	132
51.	Locus of Television Set Purchases, Percentages	133
52.	Locus of Washer Purchases, Absolute Values	134
53.	Locus of Washer Purchases, Percentages	135
54.	Locus of Automobile Purchases	137

Table		Page
55.	Locus of Motion Pictures, Absolute Values	139
56.	Locus of Motion Pictures, Percentages	140
57.	Locus of Sporting Events, Absolute Values	141
58.	Locus of Sporting Events, Percentages	142
59.	Locus of Music Events, Absolute Values	143
60.	Locus of Music Events, Percentages	144
61.	Locus of Restaurants, Absolute Values	145
62.	Locus of Restaurants, Percentages	146
63.	Place and Type of Purchase: Observed and Expected Frequencies (Sample AA)	149
64.	Determination of Total Group I, II, and III Responses for Sample AA (1967)	151
65.	Place and Type of Purchase: Observed and Expected Frequencies (Sample AA)	154
66.	Determination of Total Group I, II, and II Responses for Sample BB (1967)	156
67.	Locus of Newspaper Subscriptions in Sample AA . . .	158
68.	Locus of Newspaper Subscriptions in Sample BB . . .	158
69.	Locus of Radio Listening in Sample AA	161
70.	Locus of Radio Listening in Sample BB	162
71.	Locus of Television Viewing in Sample AA	164
72.	Locus of Television Viewing in Sample BB	165
73.	Locus of Newspaper Subscriptions.	166

Table		Page
74.	Locus of Shopping Habits for Particular Goods and Services	168
75.	Frequency Distribution of Springfield Responses (Samples A and AA)	174
76.	Cumulative Frequency Distribution for Spring- field Responses (Plus Corresponding Decimal Equivalent)	175
77.	Frequency Distribution of Columbus Responses (Samples A and AA).	177
78.	Cumulative Frequency Distributions for Columbus Responses (Plus Corresponding Decimal Equivalent)	178
79.	Frequency Distribution of Springfield Responses . . .	181
80.	Cumulative Frequency Distributions for Spring- field Responses (Plus Corresponding Decimal Equivalents)	182
81.	Frequency Distribution of Columbus Responses (Samples B and BB)	184
82.	Cumulative Frequency Distributions for Columbus Responses (Plus Corresponding Decimal Equivalent)	185

ILLUSTRATIONS

Figure		Page
1.	Map of Respondents in Combination Sample 1 and Combination Sample 2	32
2.	Map of Respondents in Sample A and Sample AA . . .	33
3.	Map of Respondents in Sample B and Sample BB . . .	34
4.	Map of the Locus of Haircut Purchases by Sample A Respondents	206
5.	Map of the Locus of Medical Services Obtained by Sample A Respondents	207
6.	Map of the Locus of Christmas Shopping Done by Sample A Respondents	208
7.	Map of the Locus of Television Set Purchases by Sample A Respondents	209
8.	Map of the Locus of Washer Purchases by Sample A Respondents	210
9.	Map of the Locus of Automobile Purchases by Sample A Respondents.	211
10.	Map of the Locus of Grocery Shopping Done by Sample A Respondents.	212
11.	Map of the Locus of Dress Clothes Purchases by Sample A Respondents.	213
12.	Map of the Locus of Work and School Clothes Purchases by Sample A Respondents	214
13.	Map of the Locus of Motion Pictures Viewed by Sample A Respondents	215

Figure		Page
14.	Map of the Locus of Sporting Events Attended by Sample A Respondents	216
15.	Map of the Locus of Music Events Attended by Sample A Respondents	217
16.	Map of the Locus of Restaurants Patronized by Sample A Respondents.	218
17.	Map of the Locus of Haircut Purchases by Sample B Respondents.	227
18.	Map of the Locus of Medical Services Obtained by Sample B Respondents	228
19.	Map of the Locus of Christmas Shopping Done by Sample B Respondents	229
20.	Map of the Locus of Television Set Purchases by Sample B Respondents.	230
21.	Map of the Locus of Washer Purchases by Sample B Respondents.	231
22.	Map of the Locus of Automobile Purchases by Sample B Respondents.	232
23.	Map of the Locus of Grocery Shopping Done by Sample B Respondents	233
24.	Map of the Locus of Dress Clothes Purchases by Sample B Respondents	234
25.	Map of the Locus of Work and School Clothes Purchases by Sample B Respondents	235
26.	Map of the Locus of Motion Pictures Viewed by Sample B Respondents.	236
27.	Map of the Locus of Sporting Events Attended by Sample B Respondents.	237

Figure		Page
28.	Map of the Locus of Music Events Attended by Sample B Respondents.	238
29.	Map of the Locus of Restaurants Patronized by Sample B Respondents	239
30.	Map of the Locus of Haircut Purchases by Sample AA Respondents	248
31.	Map of the Locus of Medical Services Obtained by Sample AA Respondents	249
32.	Map of the Locus of Christmas Shopping Done by Sample AA Respondents	250
33.	Map of the Locus of Television Set Purchases by Sample AA Respondents	251
34.	Map of the Locus of Washer Purchases by Sample AA Respondents	252
35.	Map of the Locus of Automobile Purchases by Sample AA Respondents	253
36.	Map of the Locus of Grocery Shopping Done by Sample AA Respondents	254
37.	Map of the Locus of Dress Clothes Purchases by Sample AA Respondents.	255
38.	Map of the Locus of Work and School Clothes Purchases by Sample AA Respondents	256
39.	Map of the Locus of Motion Pictures Viewed by Sample AA Respondents	257
40.	Map of the Locus of Sporting Events Attended by Sample AA Respondents	258
41.	Map of the Locus of Music Events Attended by Sample AA Respondents	259

Figure		Page
42.	Map of the Locus of Restaurants Patronized by Sample AA Respondents	260
43.	Map of the Locus of Haircut Purchases by Sample BB Respondents	269
44.	Map of the Locus of Medical Services Obtained by Sample BB Respondents	270
45.	Map of the Locus of Christmas Shopping Done by Sample BB Respondents	271
46.	Map of the Locus of Television Set Purchases by Sample BB Respondents	272
47.	Map of the Locus of Washer Purchases by Sample BB Respondents	273
48.	Map of the Locus of Automobile Purchases by Sample BB Respondents	274
49.	Map of the Locus of Grocery Shopping Done by Sample BB Respondents	275
50.	Map of the Locus of Dress Clothes Purchases by Sample BB Respondents	276
51.	Map of the Locus of Work and School Clothes Purchases by Sample BB Respondents	277
52.	Map of the Locus of Motion Pictures Viewed by Sample BB Respondents	278
53.	Map of the Locus of Sporting Events Attended by Sample BB Respondents	279
54.	Map of the Locus of Music Events Attended by Sample BB Respondents	280
55.	Map of the Locus of Restaurants Patronized by Sample BB Respondents	281

CHAPTER I

INTRODUCTION

Objectives

This analysis will concern itself with two separate studies made forty months apart. These studies will test the "law of retail gravitation," which states, "Two cities attract retail trade from an intermediate city or town in the vicinity of the breaking point, approximately in direct proportion to the populations of the two cities and in inverse proportion to the square of the distances,¹ from these two cities to the intermediate town."² This law resulted from the measurement of the sales of leading stores of all the larger cities in Texas, house-to-house interviewing of consumer buying habits, and retail stock checking in different sized cities and towns.³

¹Distance by the most direct improved automobile highway.

²William J. Reilly, The Law of Retail Gravitation (New York: The Knickerbocker Press, 1931), p. 9.

³For a description of the entire study see William J. Reilly, Methods for the Study of Retail Relationships (Austin: University of Texas, 1929).

It is important to consider the geographic and environmental elements of these studies. In general, three types of trade territories exist, namely: (1) those highly urbanized, (2) those composed of sizeable trading centers surrounded by rural areas, and (3) those sparsely populated.⁴ The law of retail gravitation was developed for the sale of fashion goods in the second type of area.⁵ Experience has proven the law as a fairly accurate predictor of the boundaries of trading areas for shopping goods.⁶ Although this was the original intent, it has been considered applicable to the other two types of territories, and, if care is taken, deemed applicable to the sale of service and convenience goods as well.⁷ In other words, the law has been considered useful in market boundary determination in the three basic types of territories and with all types of consumer goods⁸ and services. In general, however, the applicability of the law has been a subject of debate.

⁴Paul D. Converse, Harvey W. Huegy, and Robert V. Mitchell, The Elements of Marketing (6th ed.; Englewood Cliffs: Prentice-Hall, Inc., 1958), p. 31. Also, see Nelson H. Seubert, "How Big Is a Market Area?" The Journal of Marketing, III, No. 1 (July, 1938), 34.

⁵Ibid.

⁶Paul D. Converse and Harvey W. Huegy, The Elements of Marketing (3rd ed.; New York: Prentice-Hall, Inc., 1946), p. 590.

⁷Converse, Huegy, and Mitchell, op. cit., pp. 31-32.

⁸Three categories of consumer goods are generally considered today, namely: (1) convenience, (2) shopping, and (3) specialty.

Reilly made the following assumptions in regard to the law of retail gravitation:

1. The larger the city, the more outside trade it draws.
2. A city draws more trade from nearby towns than it does from more distant ones.
3. At the "breaking point" between two trade centers in competition with one another the business volume is the same.⁹

Certain omnipresent conditions offer much justification for an attempt to determine the general retail trading area of a particular commodity.¹⁰

Both of the separate studies in this analysis tested the law of retail gravitation in sizeable trading centers surrounded by rural areas for fourteen different consumer and service type goods to determine whether or not it would be possible to determine accurately the trading areas for goods and services for which it had been originally intended (i. e., shopping goods) as well as convenience and specialty goods and services. The studies attempted to test certain hypotheses.

⁹Reilly, The Law of Retail Gravitation, pp. 7-8.

¹⁰Edna Douglas, "Measuring the General Retail Trading Area--A Case Study: I," The Journal of Marketing, XIII, No. 4 (April, 1949), 481.

Hypotheses of the studies

1. The law of retail gravitation is an accurate determiner of trading areas for all types of consumer goods (i. e. , convenience, shopping, and specialty goods) and services for Columbus and Springfield, Ohio (i. e. , that it is more effective than alternative approaches, including the geographic midpoint).
2. The extent of customer patronage in Springfield and Columbus varies with different types of goods or services purchased.
3. Retail gravitation does not vary appreciably with time.

CHAPTER II

BACKGROUND

Definitions

1. Breaking point: A breaking point is a "point up to which one city exercises the dominating retail trade influence, and beyond which the other city dominates."¹¹ Through the following formula¹² derived from the "law of retail gravitation" a breaking point was determined for the two cities used in the study:

X = larger city (i. e., Columbus)

Y = smaller city (i. e., Springfield)

$$\text{Breaking point, Miles from Y} = \frac{\text{Miles between X and Y}}{1 + \sqrt{\frac{\text{Population of X}}{\text{Population of Y}}}}$$

The point determined was used as the geographic center for Samples A and AA.¹³ (See Appendix VIII.)

¹¹Reilly, The Law of Retail Gravitation, p. 8.

¹²Converse and Huegy, op. cit., p. 590.

¹³See Definition No. 7.

2. Combination Sample No. 1: The Combination Sample No. 1, as referred to in this analysis, is the total number of respondents in both Sample A and Sample B in the March, 1964 study (see Definitions No. 7 and No. 8).

3. Combination Sample No. 2: The Combination Sample No. 2, as referred to in this analysis, is the total number of respondents in both Sample AA and Sample BB in the July, 1967 study (see Definitions No. 9 and No. 10).

4. Convenience goods: Convenience goods are those goods which customers prefer to purchase "on short notice, with a minimum amount of effort, and, most characteristically of all, at a convenient location."¹⁴ These goods usually have the smallest trading areas because the number of establishments handling them is relatively large. Also, customers of these goods typically have a definite need for frequent replenishment.

5. Law of retail gravitation: The "law of retail gravitation" (i. e., Reilly's Law) states that "Two cities attract retail trade from an intermediate city or town in the vicinity of the breaking point,¹⁵ approximately in direct proportion to the populations of the

¹⁴Fred E. Clark and Carrie P. Clark, Principles of Marketing (3rd ed.; New York: The Macmillan Company, 1942), p. 163.

¹⁵See Definition No. 1.

two cities and in inverse proportion to the square of the distances (sic) from these two cities to the intermediate town."¹⁶

6. Midpoint: The term "midpoint," as used in these studies, refers to the point at the geographic center or middle of the line (i. e., U.S. 40) connecting Springfield and Columbus, Ohio. The distance between these two cities was determined by the number of miles shown on the state highway road map. The point determined was used as the geographic center for Samples B and BB.¹⁷

7. Sample A: Sample "A," as referred to in the March, 1964 study, was formed around the breaking point¹⁸ determined by the formula derived from Reilly's Law. Upon finding the breaking point, the particular people sampled were selected in such a way that each individual respondent had a geographic counterpart located on the opposite side of a line perpendicular to the straight line connecting the two cities (i. e., U.S. 40) at their sample's breaking point. This sample was selected over an area eight miles long (four miles east and four miles west of the breaking point) and ten miles wide (five miles south and five miles north of the breaking point). The geographic pattern of the respondents

¹⁶Reilly, The Law of Retail Gravitation, p. 9.

¹⁷See Definition No. 8.

¹⁸See Definition No. 1.

in the sample was determined after the area had been surveyed and took a form which would allow the respondent to have the above-mentioned geographic counterpart (see Figure 2).

8. Sample B: Sample "B," as referred to in the March, 1964 study, was formed around the midpoint¹⁹ determined by calculating one-half the distance between Springfield and Columbus, Ohio, by the most improved automobile highway. Upon finding the midpoint, the particular people sampled were selected in such a way that each individual respondent had a geographic counterpart located on the opposite side of a line perpendicular to the straight line connecting the two cities (i. e., U.S. 40) at their sample's midpoint. This sample was selected over an area ten miles long (i. e., five miles east and five miles west of the midpoint) and eight miles wide (i. e., four miles north and four miles south of the midpoint). The particular geographic pattern of the respondents in this sample was determined after the area had been surveyed and took a form which would allow the respondents to have the above-mentioned geographic counterpart (see Figure 3).

9. Sample AA: Sample "AA," as referred to in the July, 1967 study will be formed around the breaking point determined by the formula derived from Reilly's Law. Upon finding the breaking

¹⁹See Definition No. 6.

point, the particular people sampled were selected in such a way that each individual respondent had a geographic counterpart located on the opposite side of a line perpendicular to the straight line connecting the two cities (i. e., U.S. 40) at their sample's breaking point. This sample was selected over an area eight miles long (four miles east and four miles west of the breaking point). The geographic pattern of the respondents in the sample was determined after the area had been surveyed and took a form which would allow the respondent to have the above-mentioned geographic counterpart (see Figure 2).

10. Sample BB: Sample "BB," as referred to in the July, 1967 study, will be formed around the midpoint determined by calculating one-half the distance between Springfield and Columbus, Ohio, by the most improved automobile highway. Upon finding the midpoint, the particular people sampled were selected in such a way that each individual respondent had a geographic counterpart located on the opposite side of a line perpendicular to the straight line connecting the two cities (i. e., U.S. 40) at their sample's midpoint. This sample was selected over an area ten miles long (i. e., five miles east and five miles west of the midpoint) and eight miles wide (i. e., four miles north and four miles south of the midpoint). The particular geographic pattern of the respondents

in this sample was determined after the area had been surveyed and took a form which would allow the respondents to have the above-mentioned geographic counterpart (see Figure 3).

11. Shopping goods: "Shopping goods are of higher price per unit than convenience goods,²⁰ and the potential purchaser will make a special trip to several stores to inspect them before arriving at a final decision."²¹ Quality, style, suitability, and price are the common bases of comparison, and a sale depends to a considerable extent on consumer taste. It can be logically reasoned that these goods should have larger trading areas than those of convenience goods for the reasons previously stated.

12. Specialty goods: Specialty goods are "those which have a particular attraction for the consumer so that he will go out of his way to purchase them. In other words, they consist of those products which many buyers insist on having and for which they are willing to make a special purchasing effort."²² Although the

²⁰See Definition No. 4.

²¹Clare W. Barker, Ira D. Anderson, and J. Donald Butterworth, Principles of Retailing (3rd ed.; New York: McGraw-Hill Book Co., Inc., 1956), p. 49.

²²Charles F. Phillips and Delbert J. Duncan, Marketing: Principles and Methods (rev. ed.; Homewood, Ill.: Richard D. Irwin, Inc., 1952), p. 89.

definition is similar to that of shopping goods,²³ specialty goods are generally considered of higher quality, style, suitability, and price, and potential customers will exert more effort in obtaining them. Therefore, trading areas for these goods are generally larger than for shopping goods.

13. Trading area: A trading area can be conceived as a "geographically delineated region, containing potential customers for whom there exists a probability greater than zero of their purchasing a given class of products or services offered for sale by a particular firm or by a particular agglomeration of firms."²⁴ The boundaries or limits of these trading areas are not sharply or clearly defined. Usually, considerable difficulty is encountered in the determination of the boundaries between adjoining or adjacent areas because of the great amount of duplication and overlapping among the customers that are served by the competing centers.²⁵

²³See Definition No. 11.

²⁴David L. Huff, "Defining and Estimating a Trading Area," The Journal of Marketing, XXVIII (July, 1964), 38.

²⁵For a brief discussion of trading areas see Theodore N. Beckman, Nathaniel H. Engle, and Robert D. Buzzell, Wholesaling (3rd ed.; New York: Ronald Press Co., 1959), pp. 308-12.

The role and relevance of
classical location theory
to trading area analysis

Overview

Thunen is often credited with the first major work in the field of location theory. He visualized an "isolated city state" situated in a limitless plane of equal fertility and then speculated on the use of the land surrounding the isolated city state for agricultural purposes. Assuming a constant transportation rate for a given weight and distance, he reasoned that those products heavy in proportion to their volume would be cultivated nearest the city because of the greater transportation costs associated with such goods. Accordingly, he felt that the value of produce at the production point "decreases with the distance of the place of production from the market place."²⁶ Theoretically, the entire isolated city state consisted of a market center and its tributary area, with the corresponding boundaries arbitrarily defined.

Weber viewed trading areas as being much more complex in their nature. He expanded Thunen's assumption of only one center of consumption to a theoretical system encompassing an infinite number of consumption points scattered over an area with

²⁶Johann H. Von Thunen, Der Isolierte Staat in Beziehung Auf Landwirtschaft Und Nationaleconomie (3rd ed.; Berlin: Schumacker-Zarchlin, 1875), p. 37.

constant weight-distance transportation points.²⁷ He attacked the problem of a firm's decision to locate between a source of raw materials and a market.

Losch²⁸ and Christaller²⁹ both carried out detailed studies concerning the way in which development took place in an area, which formed the basis for a "central place theory."^{30, 31} The theory is based on the idea that centers of economic activity organize themselves in a regular pattern with each level of activity being spaced differently according to its magnitude and the number of competing firms. It also holds that once an area acquires a certain scope or range of economic activity it enters into a state

²⁷For a more elaborate explanation and description, see Alfred Weber, Alfred Weber's Theory of the Location of Industry, trans. C. J. Frederick (Chicago: University of Chicago Press, 1929), pp. 37-94.

²⁸See August Losch, The Economics of Location, trans. William H. Woglom and W. F. Stopler (New Haven: The Yale University Press, 1954).

²⁹See Walter Christaller, Die Zentralen Orte in Sudderitschland (Geneva: Gustav Fischer Verlag, 1933).

³⁰For an interesting study concerning the theory, see E. Ullman, "A Theory of Location for Cities," American Journal of Sociology, LXVI (May 1941), 853-64.

³¹An excellent article concerning the central place theory can be seen in William L. Garrison and B. J. L. Berry, "The Functional Bases of the Central Place Hierarchy," Economic Geography, XXXIV, No. 2 (April, 1958), 145-54.

of what Losch describes as "location equilibrium." The theory hypothesizes that firms in a competitive economy will tend to locate in the regular pattern because of their attempt to maximize the size of the market or trading area which is economical for any one producing location. Maximization of a trading area requires accurate determination of it. This theory provides valuable assistance in the understanding of trading areas and effective ways of determining them (see pp. 22-23).

Plant location analysis

Plant location analysis by producers logically preceded the analysis of trading areas carried out by retailers. Plant location analysis emerged after the scientific management movement began in the early part of the twentieth century. Several writers have since attempted to increase the number of influences considered in site selection and to discuss these problems from a practical or realistic point of view. Their results have often taken the form of a list of both objective and subjective factors to consider when choosing a new plant location. One early location theorist listed and discussed the location determinants as the location of the market . . . ; the location of raw material sources; availability of adequate transportation facilities; the kind, quality, and amount of the available labor supply; the amount, reliability and cost of

available power; . . . the cost of land and buildings; the possibility for expansion; the presence of service industries; financial facilities; water supply; tax rates; and labor legislation.³²

Sources of location literature include publications of university economic and business research bureaus and current business periodicals. The Ohio State University, Bureau of Business Research, for example, published a monograph surveying why 545 businesses chose to locate in Ohio.³³ Furthermore, business periodicals have occasionally included articles designed to remind both managers and academicians of the significant factors in site selection. One article listed the location determinants as "service industries, transportation availability, sewerage and drainage, labor supply; labor rate; financial sources; construction and land costs; taxes; insurance; power and water; climate; and community services."³⁴ Another article stressed the investigation, evaluation, selection procedure importance.³⁵

³²Ralph C. Davis, Industrial Organization in Management (New York: Harper and Bros., Publishers, 1957), pp. 216 and 219.

³³Henry L. Hunker and Alfred J. Wright, Factors of Industrial Locations in Ohio (Columbus: The Bureau of Business Research, The Ohio State University, 1963).

³⁴"Selecting the Best Site . . . In the Best Community . . . In the Best Market," Distribution Age, LXII (July, 1963), 47.

³⁵"The Art of Investigating, Evaluating, and Selecting a New Site," Business Management, XXIV (September, 1963), 49-60, 62ff.

Although the elaborate and extensive lists of factors give the manager a basis from which to make a decision, such lists can not explain the complex interrelationships nor can they present a logical procedure by which each of the many influences is taken into account.³⁶ Following the plant location problem came warehouse location. This was a natural evolutionary stage brought about partially by the great increase in the sizes of many of the producers. Also, independent or public warehouses were required to handle part of the increase in output in special cases.

Trading area analysis

Emanating from the theories surrounding optimum plant and/or warehouse location for producers is the accurate determination of trading areas by retailers. Trading areas can be conceived as "geographically delineated region(s), containing potential customers for whom there exists a probability greater than zero of their purchasing a given class of products or services offered for sale by a particular firm or by a particular agglomeration of firms."³⁷ The boundaries or limits of these trading areas

³⁶For an interesting discussion on a tool to assist in the orderly evaluation of location factors, see Robert M. Smidt and Irvin L. Reis, "Symbolic Logic and Plant Location," Journal of Industrial Engineering, XIV (Jan-Feb., 1963), 18-21.

³⁷Huff, op. cit., p. 38.

are not sharply or clearly defined. As pointed out earlier, there is usually considerable difficulty encountered in the determination of the boundaries between adjoining or adjacent areas because of the great amount of duplication and overlapping among the customers that are served by the competing centers.³⁸

Why do trading areas vary?--There are many variations which inevitably exist in the trading areas of any trading center. These variations are usually caused by the line or type of goods or services, but are also created through differences between sellers in the same line due to size of the establishments, amount or extent of concentration of the sales coverage, the breadth or extent of the merchandise or service line handled, the relative transportation costs, and other reasons. There is also the chance that specific variations have been caused due to changes that have taken place over a period of time.³⁹

Factors affecting the size of trading areas.--There are many factors which directly or indirectly affect the size of a particular trading area, such as (a) the variety and selection of goods and services and the corresponding price and quality ranges; (b) the services and service facilities which are available;

³⁸Beckman, Engle, and Buzzell, op. cit., pp. 308-12.

³⁹Ibid., p. 308.

(c) the number, size, and type of sales and specials offered; (d) the amusements and various forms of recreation offered; (e) the communication media; (f) the class of consumer; (g) the location of parking facilities; and (h) the transportation facilities and their relative availabilities.⁴⁰

Constraints in determining trading areas. -- Certain limitations or restrictions cause some difficulties to be encountered in determining trading areas.⁴¹ The establishment of objective criteria for classifying trading areas as well as the finding of objective data for bounding such areas are problems confronting the researcher in trading area determination.⁴² A limitation inherent in any survey taken to yield information useful in trading area determination is that the results are valid only for the area(s) being surveyed.⁴³ Certain conceptual and operational constraints

⁴⁰For an extensive listing of the factors conditioning the size of trading areas, see Reilly, The Law of Retail Gravitation, p. 73.

⁴¹For a general discussion of limitations encountered in determining trading areas see Paul L. Brown and William R. Davidson, Retailing: Principles and Practices (New York: Ronald Press Co., 1953), p. 69.

⁴²E. L. Ullman, "Trade Centers and Tributary Areas of the Philippines," Geographic Review, L, No. 2 (April, 1960), 203.

⁴³Robert B. Reynolds, "A Test of the Law of Retail Gravitation," The Journal of Marketing, XVII (January, 1953), 276.

are associated with the use of retail gravitation (see Definition No. 5, pages 6-7):

First, the breaking point formula, as it now exists, is incapable of providing graduated estimates above or below the break-even position between two competing centers. . . . Second, when the breaking point formula is used to delineate retail trading areas of several shopping areas within a given geographical area, the overlapping boundaries that result are inconsistent with the basic objective of the formula's use. . . . Third, the parameter which was originally estimated empirically by Reilly should not be interpreted as a constant for all types of shopping trips as so many analysts have assumed.⁴⁴

Also, it has been noted that often "transportation constraints and psychological factors jointly . . . channel rural retail search activities into rather simple patterns."⁴⁵ The following section will point out several alternative approaches for determining retail trading areas with a minimum of interference from such constraints, concluding with Reilly's "law of retail gravitation."

⁴⁴Huff, op. cit., p. 36.

⁴⁵Donald L. Thompson, "Future Directions in Retail Area Research," Economic Geography, LXII, No. 1 (January, 1966), 2. Also, see James M. Williams, An American Town: A Sociological Study (New York, 1906), p. 29.

Alternative approaches for
determining retail trading
areas

Numerous methods have been used to determine the extent of a city's trading area for various goods and services. None of these methods can be regarded as adequate in itself and, as a result, they are often combined for the most favorable (i. e., accurate) results. Some of these methods are:

1. Assuming that the advertising of newspapers affects the flow of trade, one can plot the circulation of newspapers in cities in competition with one another, considering the effect of mail-order catalogues and radio along with the overlapping circulation of competing newspapers in the intervening area.⁴⁶ This has been proven to be quite accurate. Exceptions to this accuracy do exist, as in those cases of newspapers with energetic circulation managers.⁴⁷

2. Assuming that charge accounts are common to the cities or trading centers in question, and that payment is made by check

⁴⁶Examples can be seen in Eaton V. W. Reed, "An Analysis of Retail Trading Relationships of Elgin, Illinois, a Satellite City," Studies in Business Administration, Vol. IX, No. 1 (Chicago: University of Chicago Press, 1938); and also, Ralph Cassady, Jr. and Harry T. Ostlund, "The Retail Distribution Structure of the Small City," University of Minneapolis Studies in Economics and Business (Minneapolis: University of Minnesota Press, 1935).

⁴⁷Converse, op. cit., p. 10.

on a local bank, one can plot the addresses of those writing checks to retail stores and cleared through local banks.⁴⁸

3. Assuming the majority of trade outside a city or trading center comes by automobile, a relatively simple method is as follows: (a) list license numbers of automobiles parked in the shopping area of a trading area on a given day; (b) obtain addresses of car owners from the state motor-vehicle license records; (c) plot addresses on map; (d) consider the idea that the number of automobiles owned in an area is not usually a true basis of comparison, and that conditions on the day which the sample is taken may not be normal, and make reservations accordingly.⁴⁹

4. Plot addresses of cash and credit customers in the important stores of competing retail trading centers, considering the constraints of being able to "trace" only the sales of shopping goods and limiting the "check" period to ten days or less.⁵⁰

⁴⁸An example can be seen in Austin S. Bratcher, "A Method of Delineating Retail Trade Zones," The Journal of Marketing, III, No. 3 (January, 1939), 262-64.

⁴⁹A good example of the application of this method can be found in Fred M. Jones, "A Survey of a Retail Trading Area," Bureau of Business Research Bulletin 44, College of Commerce and Business Administration (Urbana: University of Illinois, 1932).

⁵⁰For a good example see J. M. Maurer and Daniel Starch, Analysis of the Tulsa Retail Trade Area (Tulsa: Tulsa Chamber of Commerce, 1931).

5. A general method of determining trading areas is to ask people living near the estimated edges of the area where they purchase various goods and services.⁵¹

6. Reilly's "law of retail gravitation," which was tested in this study, is yet another method for describing the boundaries of trading areas. From this a "breaking point" equation was developed which, as discussed before, states that the boundary of a trading area between two towns, A and B, miles from B, is equal to:

$$\text{Breaking Point, Miles from B} = \frac{\text{Miles between A and B}}{1 + \sqrt{\frac{\text{Size of A}}{\text{Size of B}}}}$$

Although Reilly used population as the index of size in this formula in most applications, the number of central functions (i. e., the number of different kinds of retail and service businesses),⁵² as a basic measure of the attractiveness of a city or center, can also be used. The equation itself was not designed to be used for all types of goods in all areas. Instead, it must be applied to fourth

⁵¹Paul D. Converse and Fred M. Jones, Introduction to Marketing: Principles of Wholesale and Retail Distribution (New York: Prentice-Hall, Inc., 1948), p. 273.

⁵²Brian J. L. Berry, Geography of Market Centers and Retail Distribution (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967), p. 27.

and fifth level centers in the hierarchy of central places⁵³ (i.e., cities and regional capitals) to develop trading areas for goods of city order or those goods which must be sold in a city or location with a dense population if they are to be profitable. Third level centers (i.e., towns) may then be added to determine the trading areas for the next lower order of goods, followed by the second and first levels.

It is important to realize that as the level of the cities increases, the population densities increase, and the accuracy of the breaking point diminishes. A breaking point is more easily determined in rural areas because distance is the most important factor affecting one's choice due to the fact that the cost and time required in traveling to a center are so significant. Within large cities the accurate determination of a breaking point is impossible and the formula can only show that point at which two competing centers within the given metropolitan area split the customers located around it.⁵⁴

Reilly's "Law of Retail Gravitation" was the approach selected for this analysis for several reasons. Fortunately, good

⁵³For a good discussion of the hierarchy of central places, including first level (hamlets), second level (villages), third level (towns), fourth level (cities), and fifth level (regional capitals), see ibid., pp. 14-16.

⁵⁴Ibid., p. 41.

examples of trading centers were found in Columbus and Springfield, Ohio. The people living between these cities served quite well as sample respondents. Also, U.S. Highway 40 provided an excellent straight line connecting Springfield and Columbus, allowing for easier calculation of the midpoint and breaking point (see Definitions No. 1 and 7, respectively).

Tests of Reilly's Law

Douglas used five different methods to measure the retail trading area of Charlotte, North Carolina, namely:

1. Analysis of credit records.
2. Analysis of bank deposits.
3. Analysis of traffic flow.
4. Analysis of population.
5. Application of Reilly's Law of Retail Gravitation.⁵⁵

Douglas found this law provided a "remarkably accurate delineation of the Charlotte retail trading area, as judged by the other methods."⁵⁶ Reynolds, in an analysis of southwestern Iowa's retail trade, thought the law accurately determined trading areas

⁵⁵Douglas, op. cit., pp. 481-97; and Edna Douglas, "Measuring the General Retail Trading Area--A Case Study, II," The Journal of Marketing, XIV, No. 1 (July, 1949), 46-60.

⁵⁶Ibid., p. 60.

for shopping goods. However, he didn't feel the law held in another study which dealt with the entire state of Iowa.⁵⁷

In response to Reynolds' assertion that the law didn't determine retail trading areas for the study involving the entire state of Iowa, Converse stated that the formula derived from the law was formed to apply only to fashion (specialty) goods. He pointed out that if the formula was used properly with Reynolds' information, it actually gave a fairly accurate prediction of the movement of trade in fashion goods.⁵⁸ This indicates the continuing difference of opinions concerning the formula's application in the determination of retail trading areas.

Justification for the study

It is important to have an understanding of the various trading areas for different goods or commodities and services, for the different sellers of these items, and for the entire trading center or centers in question because:

1. It enables the concentration of advertising, personal selling and numerous forms of sales promotional activities and the corresponding efforts of businesses (retailers, in particular),

⁵⁷Reynolds, op. cit., pp. 273-77.

⁵⁸Paul D. Converse, "Comment on Movement of Retail Trade in Iowa," The Journal of Marketing, XVIII, No. 2 (October, 1953), 170-71.

creating greater efficiency and better overall operations of such institutions. If these activities are to be adequately controlled, the unit of territory chosen must fit the efforts expended.⁵⁹

2. It benefits specific advertising media (i. e., newspapers, radio, television, direct mail and magazines) by determining those customers to whom their advertising efforts should be directed and, with the appropriate consideration given to buyer behavior, what consumers will purchase.

3. It is extremely consequential as a factor in the selection of locations for retail stores, warehouses, and many other intermediary building locations.

4. It can be of the utmost importance to manufacturers selecting and placing exclusive agencies and franchises.

5. It can play an instrumental role in aiding sales forecasting efforts and related considerations, such as the determination of sales territories.

6. It is, in many cases, invaluable in the determination of expansion possibilities.

7. It allows the management of a firm, particularly in the sales and advertising departments or sections, to understand the company and its customers to a much greater extent. The

⁵⁹Seubert, op. cit.

knowledge of where a company is selling and what it is selling in those areas will enable it to determine more effectively to whom it is selling.

8. It benefits the public in the long run by reducing the expenses accruing from the inefficiencies that correspond with an inadequate and inaccurate understanding of trading areas. The reduction in expenses is often passed on to the consumer in the form of lower prices or better service.

From the preceding discussion, it should appear fairly evident that an accurate picture of where the consumers are located for the different firms and product lines is of definite benefit to the economy.⁶⁰

The importance of better defining and understanding trading areas for wholesalers, retailers, and manufacturers is becoming increasingly recognized. Through an accurate determination of trading area(s) management can understand the firm and its customers to a greater degree. It can provide a basis for estimating potential sales and also for determining investment

⁶⁰For a thorough discussion on the uses or advantages accruing from determining trading areas for retailers, newspapers, and manufacturers, per se, see Reilly, The Law of Retail Gravitation, pp. 36-45. Also, see Paul D. Converse, "A Study of Retail Trade Areas in East Central Illinois," University of Illinois Bulletin, XLI, No. 7 (October 5, 1943), 7.

requirements.⁶¹ The result is generally an improvement in overall operations, particularly in the advertising and sales divisions, which enables the firm to accomplish its customer service objectives more effectively.

Testing methods of determining trading areas in geographic areas where they have not previously been applied and for goods and services other than those for which they were intended may contribute to a better understanding and usefulness of trading area determination.

Information gained from the survey of buyers residing in the area between Springfield and Columbus, Ohio could be beneficial to businesses in and between the two cities.

The studies in question have certain unique characteristics, which are:

1. They deal with the area between Springfield and Columbus, Ohio.
2. They survey purchases of fourteen different goods and services (see Appendix IV), some of which have seldom, if ever, been used to test the law of retail gravitation.

⁶¹David L. Huff, "A Probabilistic Analysis of Shopping Center Trade Areas," Land Economics, XXXIX, No. 1 (February, 1963), 81.

They study geographic shopping preferences with respect to the intent of the shopping trip, a test variation not found in the literature.

4. They survey specific communication media in the two cities and their respective trading areas.

5. They are based on two equal-sized samples (i. e., fifty respondents), one of which is centered around a geographic midpoint and the other around the breaking point determined by Reilly's Law.

6. They were conducted forty months apart and thereby afford the opportunity to compare buying habits of similarly located respondents at different times.

CHAPTER III

METHODS

Sample design

Two samples of fifty respondents each were questioned as part of both the 1964 and 1967 studies. The size selected for both studies was considered large enough to yield statistically significant results and allowed for ease in tabulation and circulation. A combination of time and cost were limiting factors in both studies in the determination of sample size.

A breaking point is the "point up to which one city exercises the dominating retail trade influence, and beyond which the other city dominates."⁶² The breaking point for one sample in both the 1964 and the 1967 studies (see Sample A, Figure 2; also, see Sample AA, Figure 2) was determined by the following formula⁶³

⁶²Reilly, The Law of Retail Gravitation, p. 8.

⁶³Converse and Huegy, op. cit., p. 590.

derived from Reilly's Law to yield the theoretically correct point between the two cities.⁶⁴

X = larger city

Y = smaller city

Breaking point, Miles from Y = $\frac{\text{Distance between X and Y}}{1 + \sqrt{\frac{\text{Population of X}}{\text{Population of Y}}}}$ ⁶⁵

$$1 + \sqrt{\frac{\text{Population of X}}{\text{Population of Y}}}$$

If this formula is applied to the case in question, the following results are obtained:⁶⁶

Breaking point (in miles from Springfield or "Y") =

$$\frac{44.07}{1 + \sqrt{\frac{475,316}{83,723}}} = \frac{44.07}{1 + 2.39} = 13.00 \text{ miles (from Y).}$$

⁶⁴Technically, this law was originally intended to be used for shopping goods only. It was used for this sample to see if it could be applied to other types of goods or to services as well.

⁶⁵The distance between the cities can be found on road maps. The mileage figures shown on such maps indicate the total number of miles from a location within the city limits of one town to a location in the other town. Agencies determining mileage figures between cities arbitrarily select points within the cities from which measurements will be made.

⁶⁶Personal interviews were conducted with specialized personnel of the State Traffic Department of Ohio. Mr. De Polito, an employee of the Department, supplied the most current information available concerning the populations of and mileages between the two cities to be studied--Springfield and Columbus, Ohio. The population figures were taken from the 1960 U.S. census. The distance between Springfield and Columbus was measured from the intersection of U.S. 40 and High Street in Columbus to the corner of U.S. 40 and Oak Street in Springfield via U.S. 40. This information provided the basis for this and several other calculations.

Legend

BP = Breaking Point for Sample A as determined by Reilly's Law.

GM = Geographic Midpoint of Sample B and for area Columbus and Springfield.

X = Sample A respondents.

. = Sample B respondents.

— = Two Miles

Fig. 1. --Map of respondents in Combination Sample 1 and Combination Sample 2.

Note: Each number represents a respondent and his location.

Fig. 2. --Map of respondents in Sample A and Sample AA

Note: Each number represents a respondent and its location.

Fig. 3. --Map of respondents in Sample B and Sample BB

Therefore, the breaking point in Samples A and AA is approximately thirteen miles from Springfield (i. e. , "Y" or smaller town). It is about thirty-one miles from Columbus (i. e. , "X" or larger town).

Samples B and BB were both developed or formed around a point which was located at the geographic midpoint between Columbus and Springfield, or 22.04 miles from each (see Figure 3).

Upon finding the breaking point (for Samples A and AA) and geographic midpoint (for Samples B and BB), the particular people sampled were selected in such a way that each individual respondent had a geographic counterpart located on the opposite side of a line perpendicular to the straight line connecting the two cities (i. e. , U.S. 40) at their sample's breaking point. Samples A and AA were selected over an area eight miles long (four miles east and four miles west of the breaking point) and ten miles wide (five miles south and five miles north of the breaking point).

Samples B and BB were selected over an area ten miles long and eight miles wide. The variance between lengths and widths of the samples was required due to the construction of the roads and the location of houses on the roads. However, both samples contain the same number of square miles. (Sample A and Sample AA are

eight miles long by ten miles wide or eighty square miles, while Sample B and Sample BB are ten miles long and eight miles wide or eighty square miles.) The geographic patterns of the respondents in the two samples in both the 1964 and 1967 studies were determined after the area had been surveyed, and took forms which would allow the respondents to have the above-mentioned "geographic counterpart (see Figures 2 and 3).

A selection of samples with a minimum amount of bias and a maximum representativeness was hampered by the irregularity of the layout of the roads and houses located on the roads. The roads themselves were not perpendicular to each other or in a gridiron pattern. They were unevenly spaced in certain parts of the area. Houses along the roads were not located at regular intervals in some cases.

Respondent characteristics

Age

Age

<u>Age Group</u>	<u>1964 Sample A</u>	<u>1967 Sample AA</u>
16-25	4	3
26-35	12	10
36-45	9	10
46-55	11	12
56-65	8	5
Over 65	6	10
No Response	<u>0</u>	<u>0</u>
Total	50	50

<u>Age Group</u>	<u>1964 Sample B</u>	<u>1967 Sample BB</u>
16-25	7	3
26-35	9	9
36-45	13	20
46-55	11	7
56-65	5	8
Over 65	5	3
No Response	<u>0</u>	<u>0</u>
Total	50	50

	<u>Combination Sample No. 1</u>	<u>Combination Sample No. 2</u>
16-25	11	6
26-35	21	19
36-45	22	30
46-55	22	19
56-65	13	13
Over 65	11	13
No Response	<u>0</u>	<u>0</u>
Total	100	100

These figures point out several interesting facts concerning the ages of respondents. However, two assumptions must first be proven acceptable. First, that placing all ages into groups containing ten years each was justified. The people sampled were asked to give their ages by selecting the appropriate ten year age groups. Grouping ages by ten year periods allowed for a breakdown of the possible ages into six groups, a size with which it is much easier to work. Also, due to the fact that people often do not like to give their specific ages, this grouping allowed those sampled to

feel that they hadn't really revealed any information that was too personal. Second, that the distribution of ages within each group or bracket is even. This assumption is based on the premises that there are no good reasons to the contrary as well as the fact that the death rate is relatively constant between any ten year bracket.

Certain comments can be made regarding the ages of those people who were sampled to allow for the data to be standardized and, therefore, made usable for testing purposes, as will be described in the analysis. By multiplying the average age in each age group times the number of people in each bracket, and then summing the numbers for each bracket and dividing by the total number of respondents, it is possible to calculate the average age in both of the studies, as shown in the following:

<u>Age Group</u>	<u>Average Age in Age Group</u>	<u>No. of Combination Sample No. 1 Respondents</u>	<u>Total Age per Age Group</u>
16-25	20.5	11	225.5
26-35	30.5	21	640.5
36-45	40.5	22	891.0
46-55	50.5	22	1,111.0
56-65	60.5	13	786.5
Over 65	70.5 ⁶⁷	<u>11</u>	<u>775.5</u>
Total		100	4,430.0
Average Age per Respondent in 1964 = 44.3 years ($\frac{4,430.0}{100}$)			

⁶⁷Assumes average age in "over 65" group is 70.5 years. This assumption is supported by the fact that few if any respondents in the entire survey appeared to be over 75 years old.

<u>Age Group</u>	<u>Average Age in Age Group</u>	<u>No. of Combination Sample No. 1 Respondents</u>	<u>Total Age per Age Group</u>
16-25	20.5	6	123.0
26-35	30.5	19	579.5
36-45	40.5	30	1,315.0
46-55	50.5	19	959.5
56-65	60.5	13	786.5
Over 65	70.5 ⁶⁸	<u>13</u>	<u>916.5</u>
Total		100	4,680.0
Average Age per Respondent in 1967 = 46.8 years ($\frac{4,680.0}{100}$)			

From these figures, it appears that the 1967 average figure is approximately two and one-half years older than that found in 1964. This is supported by the fact that the 1967 study included over 80 per cent of those people surveyed in 1964 or about four-fifths of the 100 respondents aged three and one-third years (40 months). In addition, the nearly 20 per cent that moved into dwellings occupied by 1964 respondents did so most often in the past year or had aged at their newly acquired occupancies only a few months. This reduces the figure from three and one-third to probably less than three and is quite similar to the one computed above. In essence, the number of people leaving one age group and entering a higher one is assumed to be normal.

⁶⁸Ibid.

Recognizing the two and one-half year increase in the average age of respondents between the studies and the fact that each bracket contains ten years, it is assumed that one of every four respondents went into the next higher ten year age bracket. In other words, all the brackets should have gained .25 times the number of respondents in the immediately younger age bracket and should have lost .25 times the number of respondents that it had in 1964. The exceptions to this are the 16-25 year age group which loses but does not gain and the over 65 year age group which gains but does not lose. The following shows the expected 1967 figures by using the .25 constant factor.

Age Group 1964	1964 Responses	Amount of Expected Gain	Amount of Expected Loss	Net Gain or Loss Expected	Expected 1967 Responses
16-25	11	+ ----	$-(11)(.25) = 2.75$	- 2.75	= 8.25
26-35	21	+ 2.75	$-(21)(.25) = 5.25$	- 2.50	= 18.50
36-45	22	+ 5.25	$-(22)(.25) = 5.50$	- .25	= 21.75
46-55	22	+ 5.50	$-(22)(.25) = 5.50$	0	= 22.00
56-65	13	+ 5.50	$-(13)(.25) = 3.25$	+ 2.25	= 15.25
Over 65	<u>11</u>	<u>+ 3.25</u>	- ----	<u>+ 3.25</u>	<u>= 14.25</u>
Total	100	+22.25	22.25	0	100.00

Comparing these expected 1967 figures with the actual ones it is apparent that the two are very similar with the exception being the great increase in the actual figures for the 36-45 year old bracket.

It is the opinion of the author that most of the new or transient residents happened to be in that category.

The fewest number of respondents were found to be in the 16-25 year old age group. This was due to the fact that very few, if any, of the people sampled were 20 years old or less, or at the bottom half of this bracket. In reality, this group had a five (not ten) year age span.

All the people sampled responded to this question. This may be pointing out that people living in rural areas care less about whether or not others know their ages. However, by allowing those being interviewed to select an age group rather than state a specific age also aided in the excellent response to this question.

The age of the respondents in Sample AA was fairly evenly distributed, while in Sample BB it was not. The primary change from 1964 to 1967 took place in the 36-45 age classification in Sample BB, which accounted for 40 per cent (20 of 50) of the responses. Approximately two-thirds of the respondents in Combination Sample No. 1 (1964) were between 26 and 55 years old, with very even distribution in all three ten-year age classifications (i. e., 26-35, 36-45, and 46-55). Although Combination Sample No. 2 (1967) also has approximately two-thirds of its respondents with ages between 26 and 55, three responses were recorded in the 36-45 category for every two in each of the other classifications

(i.e., 26-25 and 46-55). For a summary of the respondents' ages see Appendix III, Part 3, and Appendix IV, Part 3.

Incomes

Income		
<u>Income Group</u>	<u>1964 Sample A</u>	<u>1967 Sample AA</u>
\$ 0-1,999	8	5
2,000-3,999	11	5
4,000-5,999	8	12
6,000-7,999	2	9
8,000 and over	10	9
No Response	<u>11</u>	<u>10</u>
Total	50	50
	<u>Sample B</u>	<u>Sample BB</u>
\$ 0-1,999	3	4
2,000-3,999	6	5
4,000-5,999	14	8
6,000-7,999	10	5
8,000 and over	8	16
No Response	<u>9</u>	<u>12</u>
Total	50	50
	<u>Combination Sample No. 1</u>	<u>Combination Sample No. 2</u>
\$ 0-1,999	11	9
2,000-3,999	17	10
4,000-5,999	22	20
6,000-7,999	12	14
8,000 and over	18	25
No Response	<u>20</u>	<u>22</u>
Total	100	100

The income groups selected were in \$2,000 intervals. This was done for several reasons. First, it reduced the total number of groups to five, which allowed for a more workable size with which to gather and analyze the data. Second, due to the fact that incomes in rural areas vary much more than the average due to the dependence on a successful crop and also the variability of market prices. If specific income figures were used, there would often be appreciable variations from the norm or average, while a relatively large bracket allows for the significant general trends to be seen. Third, due to the fact that many people consider their income to be a personal matter, they would refuse to state specific but not general income figures. In other words, by allowing the people sampled to pick their income group rather than give their exact income it was felt that more responded than would have otherwise been the case.

Certain characteristics concerning the incomes of those people who were sampled can be mentioned. By multiplying the average income in each income group times the number of people in the group, and then summing the numbers for each group and dividing by the total number of respondents, it is possible to

calculate the average income in both of the studies, as shown in the following:

<u>Income Group</u>	<u>Average Income in Income Group</u>	<u>No. of Combination Sample No. 1 Respondents</u>	<u>Total Income per Income Group</u>
\$ 0-1, 999	1, 000	11	11, 000
2, 000-3, 999	3, 000	17	51, 000
4, 000-5, 999	5, 000	22	110, 000
6, 000-7, 999	7, 000	12	84, 000
8, 000 and over	10, 000	<u>18</u>	<u>180, 000</u>
Total		80	436, 000

Average Income per 1964 Respondent = \$5, 450 (approximately)

<u>Income Group</u>	<u>Average Income in Income Group</u>	<u>No. of Combination Sample No. 1 Respondents</u>	<u>Total Income per Income Group</u>
\$ 0-1, 999	1, 000	9	9, 000
2, 000-3, 999	3, 000	10	30, 000
4, 000-5, 999	5, 000	20	100, 000
6, 000-7, 999	7, 000	14	98, 000
8, 000 and over	10, 000	<u>25</u>	<u>250, 000</u>
Total		78	487, 000

Average Income per 1967 Respondent = \$6, 250 (approximately)

From these figures it can be recognized that the 1967 figure is approximately \$800 more than the 1964 counterpart. If a 5 per cent per year median family income increase is realized, or approximately \$270 on a \$5, 450 base, the incomes should have risen about \$810, or almost the same as the one computed above.

The five per cent is not felt to be excessive with the relatively low beginning or base annual income in rural areas, the shift away from agricultural jobs primarily due to higher paying jobs in other areas, and the great overall sustained growth in the economy as can readily be seen in the tremendous increase in the GNP.

Recognizing the \$800 increase in the average income of respondents between the studies and the fact that each income bracket contains \$2,000, it is assumed that two out of five went into the next higher \$2,000 income bracket. In other words, all the brackets should have gained .4 times the number of respondents in the immediately lower income class and should have lost .4 times the number of respondents that it had in 1964. The exceptions to this are the \$0-2,000 income bracket which is assumed to lose but not gain and the over \$8,000 class, which is assumed to gain but not lose. The following shows the expected figures by using the .4 constant factor.

<u>Income Group</u> <u>1964</u>	<u>1964</u> <u>Responses</u>	<u>Amount</u> <u>of</u> <u>Expected</u> <u>Gain</u>	<u>Amount</u> <u>of</u> <u>Expected</u> <u>Loss</u>	<u>Net Gain</u> <u>or Loss</u> <u>Expected</u>	<u>Expected</u> <u>1967</u> <u>Responses</u>
\$ 0-1,999	11	----	11(.4) = 4.4	-4.4	6.6
2,000-3,999	17	+ 4.4	17(.4) = 6.8	-2.4	14.6
4,000-5,999	22	+ 6.8	22(.4) = 8.8	-2.0	20.0
6,000-7,999	12	+ 8.8	12(.4) = 4.8	+4.0	16.0
8,000 and over	<u>18</u>	<u>+ 4.8</u>	-----	<u>+4.8</u>	<u>22.8</u>
Total	80	+24.8	-24.8	0	80.0

The expected results are extremely close to the actual ones. This will allow the expected figures, as determined by adjusting the 1964 figures by a factor of .4 to be used at a later time in the analysis.

Occupation

Occupation		
<u>Occupation</u>	<u>1964 Sample A</u>	<u>1967 Sample AA</u>
Farmer	20	18
Factory and related jobs	10	14
Business and sales jobs	7	5
Retired	4	4
Other	8	9
No Response	<u>1</u>	<u>0</u>
Total	50	50
	<u>1964 Sample B</u>	<u>1967 Sample BB</u>
Farmer	18	13
Factory and related jobs	9	8
Business and sales jobs	6	8
Retired	0	4
Other	17	17
No Response	<u>0</u>	<u>0</u>
Total	50	50

<u>Occupation</u>	<u>Combination Sample No. 1</u>	<u>Combination Sample No. 2</u>
Farmer	38	31
Factory and related jobs	19	22
Business and sales jobs	13	13
Retired	4	8
Other	25	26
No Response	<u>1</u>	<u>0</u>
Total	100	100

Occupations of the respondents in Sample AA and those in Sample BB were fairly similar, as measured by the number of those people surveyed belonging to arbitrarily chosen occupational classifications. There were some realistic changes that took place between the 1964 and 1967 studies, however. Farming declined almost 20 per cent (from 38 to 31) while factory jobs increased about 15 per cent (from 19 to 22) and the number of retired people increased 50 per cent (from 4 to 8). These figures support two highly publicized American economic trends. First, that the population is shifting from agricultural to industrial jobs. Second, that the number of people retired is increasing rapidly due to compulsory retirement in some cases, as well as a longer average life span due to medical as well as psychological advances (see Appendix III, Part 4, and Appendix IV, Part 4).

Questionnaire construction
and interviewing

Initially, in both studies, a questionnaire was constructed, with the goal of obtaining the most comprehensive and accurate information possible in the most efficient manner. It sought information as to where the households being sampled purchased the various classes or categories of goods and services and also provided for the acquisition of certain classification data. A sample copy of this questionnaire is presented in Appendix VII.

In both studies information obtained from interviews was recorded on work sheets. The responses from the work sheets were initially transferred to a condensed and organized sheet which showed each respondent's name, number, and "coded" responses. These results were then tabulated in order to arrive at a composite of the results. An analysis was then undertaken by means of a segmented approach in which each particular good or service was studied separately.

Limitations

There were certain limitations encountered in both studies that were attempted to be minimized. An inherent limitation in the studies was that the results from the survey are valid only for the area being surveyed. Also, there were various conceptual and operational constraints associated with the use of the law of retail gravitation which existed.⁶⁹ The respondents themselves were limiting factors in the study. A few of them would not answer the questions because they felt that the interviewer was selling, not interviewing. Others could not remember where they purchased various goods and/or services. Also, there was a small number of them who may have given answers that they felt would either improve their status or answers that the interviewer "expected," rather than the correct or actual one.

Another limitation was due to the fact that certain categories of goods and services were not used or purchased often enough to yield information from which to form the most meaningful relationships.

The selection of samples with a minimum amount of bias and a maximum of representativeness was limited by the

⁶⁹See Chapter II, p. 19.

irregularity of the layout of the roads and the location of houses on the roads. Certain roads were not perpendicular to each other and were unevenly spaced in various sections of the area. Some of the houses were not located at regular intervals along the roads.

CHAPTER IV
FINDINGS FOR MARCH, 1964 STUDY
(SAMPLE A AND SAMPLE B)

Key to analyses

The following information will be helpful in understanding the analyses of the various categories of goods, which will begin on page 53:

1. The thirteen goods and services analyzed will be grouped into three sections as follows:

Group I (selected convenience goods and services, and clothing)

- Haircuts
- Medical services
- Christmas shopping
- Groceries
- Dress clothes
- Work and school clothes

Group II (selected shopping and specialty goods)

- Television sets
- Washers
- Automobiles

Group III (selected shopping and specialty services)

Motion pictures
Sporting events
Music events
Restaurants

2. The presentation of information about each category contains the following:

- a. Table summarizing sample responses
- b. Comment on category

3. Reference will often be made to "Sample A" and "Sample B." These samples are discussed under Definitions 6 and 7.

"Combination Sample No. 1" simply refers to the combination of the two samples mentioned above (see Definition 2).

4. Each discussion will make reference to a map of respondent locations and preferences that can be found in an appendix.

Findings for specific goods and services: Group I

General discussion of Group I

Group I basically consists of convenience type goods and services, or those that people desire immediately, frequently, and will exert a minimum amount of effort in obtaining them. The following goods and services have been included in this group (as compared to the two other groups) because they most nearly meet

the above stated criteria: haircuts, medical services, Christmas shopping,⁷⁰ groceries, dress clothes,⁷¹ and work and school clothes.⁷²

Locus of haircuts

Combination Sample No. 1 points out that less than one-fifth (16 per cent in Springfield and 2 per cent in Columbus, or 18 per cent) stated that they had their hair cut in Springfield or Columbus. Of these, almost all were in Sample A and received their haircuts from barbers in Springfield. Most of these men also had their jobs located in that city.

From the results, it can be observed that the differences in the skills and other characteristics and traits of barbers was not important enough to most people to warrant a special trip from the rural areas into the cities. The service of haircutting may be considered a "convenience" because these people who desire it want

⁷⁰Many items bought for Christmas are purchased locally. Although the majority of the money on this category was spent in the two cities, most of the goods purchased there were necessities to these rural people and were not considered shopping or specialty goods.

⁷¹This category is often considered a shopping good. However, considering the particular group sampled, clothing should be considered as an item which is bought with a minimum amount of effort.

⁷²Ibid.

it immediately, frequently, and will exert a minimum amount of effort in getting it (relative to other services). Therefore, the study of trading areas for this service is not very revealing in terms of the structure of this study.

TABLE 1
LOCUS OF HAIRCUT PURCHASES, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Haircuts Obtained in Springfield	Haircuts Obtained in Columbus	Haircuts Obtained in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	10	0	11	4	25
C side of BP	<u>6</u>	<u>0</u>	<u>16</u>	<u>3</u>	<u>25</u>
Total	16	0	27	7	50
<u>Sample B^b</u>					
S side of M	0	2	22	1	25
C side of M	<u>0</u>	<u>0</u>	<u>22</u>	<u>3</u>	<u>25</u>
Total	0	2	44	4	50
<u>Combination Sample No. 1</u>					
	16	2	71	11	100

^aFor map, see Appendix I, Figure 4.

^bFor map, see Appendix II, Figure 17.

TABLE 2

LOCUS OF HAIRCUT PURCHASES, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Haircuts Obtained in Springfield	Haircuts Obtained in Columbus	Haircuts Obtained in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample A^a</u>				
S side of BP	20	0	22	8	50
C side of BP	<u>12</u>	<u>0</u>	<u>32</u>	<u>6</u>	<u>50</u>
Total	32	0	54	14	100
<hr/>					
	<u>Sample B^b</u>				
S side of M	0	4	44	2	50
C side of M	<u>0</u>	<u>0</u>	<u>44</u>	<u>6</u>	<u>50</u>
Total	0	4	88	8	100
<hr/>					
	<u>Combination Sample No. 1</u>				
	16	2	71	11	100
<hr/>					

^aFor map, see Appendix I, Figure 4.^bFor map, see Appendix II, Figure 17.

Locus of medical services

Nearly 80 per cent of the respondents indicated that their medical doctors were located outside the two cities in question, primarily in the local area. Of the remaining one-fifth (16 per cent in Springfield and 4 per cent in Columbus, as shown in the Combination Sample No. 1), the majority were members of Sample A area and procured doctor or medical service from Springfield.

TABLE 3

LOCUS OF MEDICAL SERVICES, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Medical Services Obtained in Springfield	Medical Services Obtained in Columbus	Medical Services Obtained in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	10	0	14	1	25
C side of BP	<u>5</u>	<u>1</u>	<u>18</u>	<u>1</u>	<u>25</u>
Total	15	1	32	2	50
<u>Sample B^b</u>					
S side of M	1	1	23	0	25
C side of M	<u>0</u>	<u>2</u>	<u>22</u>	<u>1</u>	<u>25</u>
Total	1	3	45	1	50
<u>Combination Sample No. 1</u>					
	16	4	77	3	100

^aFor map, see Appendix I, Figure 5.

^bFor map, see Appendix II, Figure 18.

TABLE 4

LOCUS OF MEDICAL SERVICES, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Medical Services Obtained in Springfield	Medical Services Obtained in Columbus	Medical Services Obtained in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	20	0	28	2	50
C side of BP	<u>10</u>	<u>2</u>	<u>36</u>	<u>2</u>	<u>50</u>
Total	30	2	64	4	100
<u>Sample B^b</u>					
S side of M	2	2	46	0	50
C side of M	<u>0</u>	<u>4</u>	<u>44</u>	<u>2</u>	<u>50</u>
Total	2	6	90	2	100
<u>Combination Sample No. 1</u>					
	16	4	77	3	100

^a For map, see Appendix I, Figure 5.^b For map, see Appendix II, Figure 18.

Although there are appreciable differences in the variety of medical services and skills offered by medical doctors, only one-fifth (as discussed above) felt that the difference was great or significant enough for them to travel to Springfield or Columbus for the majority of their medical work.

A factor influencing respondent behavior may be the relatively low average incomes of the respondents. By going to local doctors the people saved not only the transportation and time expense of driving into the cities, but usually had their medical services, per se, provided at a lower cost (assuming rural doctors charge less than urban ones for the same services). Because medical work is often needed quickly, as in the cases of accidents, child delivery, and other emergency situations, travel time often is important enough for favoring local doctors.

Locus of Christmas shopping

As indicated in the discussion of Group I items on page 53, this category could be placed in any of the three groups. Therefore, this discussion should point out characteristics of Christmas shopping as an overall measure of the purchasing of goods and services. Although the total dollar value of sales for the respondents at Christmas time was greater in the two cities than locally, the total number of separate items purchased locally was felt to be as great, if not greater. This is due to the fact that many of the smaller or minor items were bought locally.

This category can be used as an indicator of where people buy when their objective is to acquire a considerable amount of all kinds of consumer goods at a specific time. About five-eighths

(64 per cent) of the respondents in Sample A bought in Springfield, and about the same percentage (62 per cent) of the respondents in Sample B did the majority of their Christmas shopping in Columbus. In total, 70 per cent (35 per cent in Springfield and 35 per cent in Columbus, as shown in the Combination Sample No. 1) of the respondents in each of the samples did their purchasing in one of the two cities.

TABLE 5
LOCUS OF CHRISTMAS SHOPPING, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

		Christmas Shopping Done in Springfield	Christmas Shopping Done in Columbus	Christmas Shopping Done in Other Towns	No Response	Total Number in Sample
<hr/>						
<u>Sample A^a</u>						
S side of BP	20	0	8	1	25	
C side of BP	<u>12</u>	<u>4</u>	<u>18</u>	<u>0</u>	<u>25</u>	
Total	32	4	13	1	50	
<hr/>						
<u>Sample B^b</u>						
S side of M	3	12	10	0	25	
C side of M	<u>0</u>	<u>19</u>	<u>4</u>	<u>2</u>	<u>25</u>	
Total	3	31	14	2	50	
<hr/>						
<u>Combination Sample No. 1</u>						
	35	35	27	3	100	
<hr/>						

^aFor map, see Appendix I, Figure 6.

^bFor map, see Appendix II, Figure 19.

TABLE 6
LOCUS OF CHRISTMAS SHOPPING, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Christmas Shopping Done in Springfield	Christmas Shopping Done in Columbus	Christmas Shopping Done in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample A^a</u>				
S side of BP	40	0	8	2	50
C side of BP	<u>24</u>	<u>8</u>	<u>18</u>	<u>0</u>	<u>50</u>
Total	64	8	26	2	100
<hr/>					
	<u>Sample B^b</u>				
S side of M	6	24	20	0	50
C side of M	<u>0</u>	<u>38</u>	<u>8</u>	<u>4</u>	<u>50</u>
Total	6	62	28	4	100
<hr/>					
	<u>Combination Sample No. 1</u>				
	35	35	27	3	100

^aFor map, see Appendix I, Figure 6.

^bFor map, see Appendix II, Figure 19.

With Christmas occurring only once annually and the tradition of giving presents fairly universal, people generally spend more money at this time than at any other throughout the year. Because of this, they sometimes travel longer distances because:

1. The variety and assortment of goods offered in the cities appears to become more important in the fulfillment of their

needs. The people are in the market for many products in many lines of trade.

2. There is a probability that because of quantity buying and correspondingly greater spending the travel time and expense can be spread over a greater number and amount of purchase.

3. It provides an opportunity for families to go to the "big city."

Another reason why people do the majority of this type of shopping in the cities is the fact that almost all of the shopping centers and department stores provide a great number of goods in a given location in either Springfield or Columbus. Many of the respondents shopped at the Great Western Shopping Center and at stores such as Lazarus and Schottenstein's in Columbus. In Springfield, much of the Christmas shopping was done at stores such as Wren's and Sears Roebuck.

Of the three-tenths of the people sampled that did their Christmas shopping locally (in neither Columbus nor Springfield), many did not have adequate transportation available to them. Also, those with small incomes may have felt that the amount they had to spend did not warrant a separate trip into the city. It is important to remember that although many who spent the majority of their dollars in one of the two cities actually purchased

the greatest number of goods and services in local towns and villages during the Christmas season. Items such as Christmas cards, wrapping paper and ribbons, Christmas trees, various trimmings for the tree such as tinsel, strings of lights and light bulbs, and other ornaments are often bought near home. Also, foods, candies, cosmetics, small appliances, and other necessities are also often bought locally during the holiday season.

Locus of grocery shopping

Only about one-tenth (8 per cent in Springfield and 3 per cent in Columbus, as shown in the Combination Sample No. 1) of the people sampled bought their groceries in the city, and the majority of these respondents lived in the Sample A area and worked in Springfield. Groceries are generally classified in the "convenience good" category (those goods which are purchased immediately, frequently, and with a minimum amount of effort), and the results are, therefore, fairly understandable and reasonable.

TABLE 7
LOCUS OF GROCERY SHOPPING, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Grocery Shopping Done in Springfield	Grocery Shopping Done in Columbus	Grocery Shopping Done in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	5	0	20	0	25
C side of BP	<u>3</u>	<u>0</u>	<u>21</u>	<u>1</u>	<u>25</u>
Total	8	0	41	1	50
<u>Sample B^b</u>					
S side of M	0	1	24	0	25
C side of M	<u>0</u>	<u>2</u>	<u>23</u>	<u>0</u>	<u>25</u>
Total	0	3	47	0	50
<u>Combination Sample No. 1</u>					
	8	3	88	1	100

^aFor map, see Appendix I, Figure 10.

^bFor map, see Appendix II, Figure 23.

In the Sample A area, Shoemaker's, a supermarket in South Vienna, Ohio, appeared to be attracting most of the grocery trade. This establishment offered goods which were comparable in price and in selection to those found in the city. In Sample B, grocery stores in London, Ohio offered goods that were comparable to those found in the city stores, for all practical purposes.

TABLE 8
LOCUS OF GROCERY SHOPPING, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Grocery Shopping Done in Springfield	Grocery Shopping Done in Columbus	Grocery Shopping Done in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample A^a</u>				
S side of BP	10	0	40	0	50
C side of BP	<u>6</u>	<u>0</u>	<u>42</u>	<u>2</u>	<u>50</u>
Total	16	0	82	2	100
<hr/>					
	<u>Sample B^b</u>				
S side of M	0	2	48	0	50
C side of M	<u>0</u>	<u>4</u>	<u>46</u>	<u>0</u>	<u>50</u>
Total	0	6	94	0	100
<hr/>					
	<u>Combination Sample No. 1</u>				
	8	3	88	1	100

^aFor map, see Appendix I, Figure 10.

^bFor map, see Appendix II, Figure 23.

Locus of dress clothes purchases

Very few of these rural respondents actually bought dress or fashion clothes per se. Most of the respondents who answered that they purchased dress clothes appeared to be talking about "good" work and school clothes. With this in mind, it should be

realized that over three-fifths (32 per cent in Springfield and 30 per cent in Columbus, as shown in the Combination Sample No. 1) of the respondents bought the majority of their dress or formal clothing in either Springfield or Columbus. In this case, 60 per cent of Sample A bought in Springfield and one-half (50 per cent) of Sample B purchased in Columbus. There was again very little overlapping between the trading areas.

Considering those people who did not buy most of their dress or good clothes in the cities, many had low incomes and, therefore, could not afford the particular type of clothing. Others presumably felt that there was little social need for, or, for that matter, opportunity to use this class of clothing. Of those purchasing dress clothes outside the two cities, the great majority, particularly in Sample B, bought goods from clothing stores located in London, Ohio.

Clothing, particularly⁷³ of the dress or formal kind, is much less common to rural than urban people in general. This means that although three-fifths (approximately) of all respondents traveled to the city, or at least said they did, they will, over the

⁷³R. G. Golledge, G. Rushton, and W. A. V. Clark, "Some Spatial Characteristics of Iowa's Dispersed Farm Population and Their Implications for the Grouping of Central Place Functions," Economic Geography, LXII, No. 3 (July, 1966), 263.

same period of time, probably purchase less per capita than people living in the city.

TABLE 9
LOCUS OF DRESS CLOTHES PURCHASES,
ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Dress Clothes Purchased in Springfield	Dress Clothes Purchased in Columbus	Dress Clothes Purchased in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample A^a</u>				
S side of BP	20	0	4	1	25
C side of BP	<u>10</u>	<u>5</u>	<u>10</u>	<u>0</u>	<u>25</u>
Total	30	5	14	1	50
<hr/>					
	<u>Sample B^b</u>				
S side of M	1	9	14	1	25
C side of M	<u>1</u>	<u>16</u>	<u>4</u>	<u>4</u>	<u>25</u>
Total	2	25	18	5	50
<hr/>					
	<u>Combination Sample No. 1</u>				
	32	30	32	6	100
<hr/>					

^aFor map, see Appendix I, Figure 11.

^bFor map, see Appendix II, Figure 24.

TABLE 10
LOCUS OF DRESS CLOTHES PURCHASES,
PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Dress Clothes Purchased in Springfield	Dress Clothes Purchased in Columbus	Dress Clothes Purchased in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample A^a</u>				
S side of BP	40	0	8	2	50
C side of BP	<u>20</u>	<u>10</u>	<u>20</u>	<u>0</u>	<u>50</u>
Total	60	10	28	2	100
<hr/>					
	<u>Sample B^b</u>				
S side of M	2	18	28	2	50
C side of M	<u>2</u>	<u>32</u>	<u>8</u>	<u>8</u>	<u>50</u>
Total	4	50	36	10	100
<hr/>					
	<u>Combination Sample No. 1</u>				
	32	30	32	6	100

^aFor map, see Appendix I, Figure 11.

^bFor map, see Appendix II, Figure 24.

Locus of work and school clothes
purchases

The trading areas of Springfield and Columbus for work and school clothes somewhat approximates those areas for dress or formal clothes. Although it seems illogical to have similar trading areas with dress clothes usually considered to have higher unit

values and more shopping time involved in their selection than work and school clothes, the results oppose this idea. The seemingly incorrect results may possibly be due to an inadequacy in the questionnaire, namely, both items were listed together. With one immediately following the other, certain people may have answered the same for both questions because the same "general" good was involved. Also, what many respondents considered dress clothes were actually no more than good work and school clothes.

TABLE 11
LOCUS OF WORK AND SCHOOL CLOTHES
PURCHASES, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	W. and S. Clothes Purchased in Springfield	W. and S. Clothes Purchased in Columbus	W. and S. Clothes Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	21	0	4	0	25
C side of BP	<u>12</u>	<u>5</u>	<u>7</u>	<u>1</u>	<u>25</u>
Total	33	5	11	1	50
<u>Sample B^b</u>					
S side of M	1	7	17	0	25
C side of M	<u>0</u>	<u>14</u>	<u>11</u>	<u>0</u>	<u>25</u>
Total	1	21	28	0	50
<u>Combination Sample No. 1</u>					
	34	26	39	1	100

^aFor map, see Appendix I, Figure 12.

^bFor map, see Appendix II, Figure 25.

TABLE 12
LOCUS OF WORK AND SCHOOL CLOTHES PURCHASES,
PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	W. and S. Clothes Purchased in Springfield	W. and S. Clothes Purchased in Columbus	W. and S. Clothes Purchased in Other Towns	No Response	Total Number in Sample
<hr/>					
	Sample A ^a				
S side of BP	42	0	8	0	50
C side of BP	<u>24</u>	<u>10</u>	<u>14</u>	<u>2</u>	<u>50</u>
Total	66	10	22	2	100
<hr/>					
	Sample B ^b				
S side of M	2	14	34	0	25
C side of M	<u>0</u>	<u>28</u>	<u>22</u>	<u>0</u>	<u>25</u>
Total	2	42	56	0	50
<hr/>					
	Combination Sample No. 1				
	34	26	39	11	100

^aFor map, see Appendix I, Figure 12.

^bFor map, see Appendix II, Figure 25.

Findings of specific goods and services: Group II

General discussion of Group II

Group II basically consists of shopping and specialty types of goods, or those that people don't generally desire immediately and frequently. They will exert more than a minimum amount of effort in obtaining them. The following goods have been selected for this group (as compared to the other two groups) because they most nearly meet the above stated criteria: television sets, washers, and automobiles.

Locus of television set purchases

Approximately two-fifths (25 per cent in Springfield and 14 per cent in Columbus, as shown in Combination Sample No. 1 below) of the respondents bought their last television sets in Springfield or Columbus. About one-half (48 per cent) of those people in Sample A purchased their sets in Springfield, and almost one-fourth (24 per cent) in Sample B had bought their present sets in Columbus.

It is interesting to note that there is almost a 2:1 ratio (i. e. , 25:14) of trading area "strength" in this case compared to a 1:1 (i. e. , 35:35) ratio in the case of Christmas shopping. A reason for this may be the fact that people buying television sets know what they are looking for and where to find it while those doing Christmas

shopping have less specific shopping information prior to their trips.

TABLE 13
LOCUS OF TELEVISION SET PURCHASES,
ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Television Sets Purchased in Springfield	Television Sets Purchased in Columbus	Television Sets Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	16	0	9	0	25
C side of BP	<u>8</u>	<u>2</u>	<u>13</u>	<u>2</u>	<u>25</u>
Total	24	2	22	2	50
<u>Sample B^b</u>					
S side of M	1	4	19	1	25
C side of M	<u>0</u>	<u>8</u>	<u>16</u>	<u>1</u>	<u>25</u>
Total	1	12	35	2	50
<u>Combination Sample No. 1</u>					
	25	14	57	4	100

^aFor map, see Appendix I, Figure 7.

^bFor map, see Appendix II, Figure 20.

TABLE 14
LOCUS OF TELEVISION SET PURCHASES,
PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Television Sets Purchased in Springfield	Television Sets Purchased in Columbus	Television Sets Purchased in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample A^a</u>				
S side of BP	32	0	18	0	50
C side of BP	<u>16</u>	<u>4</u>	<u>26</u>	<u>4</u>	<u>50</u>
Total	48	4	44	4	100
<hr/>					
	<u>Sample B^b</u>				
S side of M	2	8	38	2	50
C side of M	<u>0</u>	<u>16</u>	<u>32</u>	<u>2</u>	<u>50</u>
Total	2	24	70	4	100
<hr/>					
	<u>Combination Sample No. 1</u>				
	25	14	57	4	100

^aFor map, see Appendix I, Figure 7.

^bFor map, see Appendix II, Figure 20.

Considering the 61 per cent of the respondents that did not state that they purchased their last television sets in Springfield or Columbus, 57 per cent did say that they bought their sets outside the two cities in question. Of these, the majority purchased or bought

from friends, relatives, or dealers in London, Ohio. For this durable good, the city dealers apparently offered several advantages, such as:

1. More dealers.
2. More types of television sets (models, styles, colors, and sizes).
3. Better bargains because of greater competition, usually.
4. Additional amusements, entertainment services, and stores of many kinds located nearby and not found in the rural areas, to as great an extent.

On the other hand, local purchases appeared to offer the following benefits:

1. More personal service.
2. Advantages accruing from personal acquaintances.
3. Less high pressure salesmanship.

Locus of washer purchases

The results for this durable shopping good vary only slightly from those of the television set category. It is assumed that the trading areas are affected by approximately the same factors and to the same extent as those given in the previous discussion.

TABLE 15
LOCUS OF WASHER PURCHASES,
ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Washers Purchased in Springfield	Washers Purchased in Springfield	Washers Purchased in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample A^a</u>				
S side of BP	17	0	7	1	25
C side of BP	<u>6</u>	<u>2</u>	<u>10</u>	<u>7</u>	<u>25</u>
Total	23	2	17	8	50
<hr/>					
	<u>Sample B^b</u>				
S side of M	1	1	20	3	25
C side of M	<u>0</u>	<u>8</u>	<u>14</u>	<u>3</u>	<u>25</u>
Total	1	9	34	6	50
<hr/>					
	<u>Combination Sample No. 1</u>				
	24	11	51	14	100

^aFor map, see Appendix I, Figure 8.

^bFor map, see Appendix II, Figure 21.

TABLE 16
LOCUS OF WASHER PURCHASES,
PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Washers Purchased in Springfield	Washers Purchased in Columbus	Washers Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	34	0	14	2	50
C side of BP	<u>12</u>	<u>4</u>	<u>20</u>	<u>14</u>	<u>50</u>
Total	46	4	34	16	100
<u>Sample B^b</u>					
S side of M	2	2	40	6	50
C side of M	<u>0</u>	<u>16</u>	<u>28</u>	<u>6</u>	<u>50</u>
Total	2	18	68	12	100
<u>Combination Sample No. 1</u>					
	24	11	51	14	100

^aFor map, see Appendix I, Figure 8.

^bFor map, see Appendix II, Figure 21.

Locus of automobile purchases⁷⁴

Of the approximately three-tenths (20 per cent in Springfield and 9 per cent in Columbus, as shown in Combination Sample No. 1 below) that were bought in the cities, the majority were purchased

⁷⁴Last two automobiles purchased by individual respondents were considered in the study.

in Springfield by respondents in Sample A. This is primarily due to reasons previously mentioned in the discussion of television sets (durable shopping good).

TABLE 17
LOCUS OF AUTOMOBILE PURCHASES^a

Legend: BP = Breaking Point M = Midpoint

	Autos Purchased in Springfield	Autos Purchased in Columbus	Autos Purchased In Other Towns	No Response	Total Number in Sample
<hr/>					
		<u>Sample A^b</u>			
S side of BP	13.0	<u>1</u>	11	0	25
C side of BP	<u>4.5</u>	<u>1</u>	<u>16</u>	<u>3.5</u>	<u>25</u>
Total	17.5	2	27	3.5	50
<hr/>					
		<u>Sample B^c</u>			
S side of M	1.5	<u>2</u>	20.5	1.0	25
C side of M	<u>1.0</u>	<u>5</u>	<u>17.5</u>	<u>1.5</u>	<u>25</u>
Total	2.5	7	38	2.5	50
<hr/>					
	<u>Combination Sample No. 1</u>				
	20	9	65	6	100

^aFigures are expressed in percentages (found by dividing the responses, which were twice as great in this case, by two). Therefore, a table of absolute values was not constructed for this category only.

^bFor map, see Appendix I, Figure 9.

^cFor map, see Appendix II, Figure 22.

The advantages of a city automobile dealer are several, such as:

1. Greater selection (style, color, model, size).
2. Better trained salesmen.
3. Greater access to parts and supplies.
4. Although probably a more thorough credit "check, "

there is generally a greater leniency in granting credit because of greater ability to bear risk.

The previously discussed advantages seem to be more than offset by those offered by the local dealers, such as:

1. Lower pressure in selling.
2. More personalized service.
3. Several benefits if there is a personal acquaintance between dealer and buyer.
4. Better knowledge of the reputation and status of the particular dealer.

The Chevrolet dealer in London, Ohio appears to be very successful in attracting trade in the area because it is a fairly high-volume business, matches and/or betters offers made by city dealers in regard to prices, and has a very good service and repair department. The Ford dealer also attracts much of the automobile trade to London.

A great number of people purchased from relatives or other individuals, as in the cases of television sets and washers. This means that although the trading areas for city automobile dealers may be quite wide (typical of a shopping and/or specialty good, and particularly one of high unit value), their coverage within the area will continue to be relatively weak as long as people continue to buy from each other as much as they are doing presently.

Findings of specific goods and services: Group III

General discussion of Group III

Group III consists of "shopping or specialty" type services, or those that aren't desired immediately and frequently. People will exert more than a minimum amount of effort to obtain them. The following services have been included in this group (as compared to the other two groups) because they most nearly meet the above stated criteria: motion pictures, sporting events, music events, and restaurants.

Locus of motion pictures

Approximately two-fifths (21 per cent in Springfield and 21 per cent in Columbus, as shown in the Combination Sample No. 1) of the people sampled said that they traveled to the cities most of the time when they wanted to see a "movie." About one-third (34

per cent) of Sample A went to Springfield and the same proportion of Sample B went to Columbus. There was very little overlapping of trading areas.

Considering the remaining 58 per cent of the respondents, the great majority of this group indicated that they never went to see a "movie," primarily because they had a television set.

TABLE 18
LOCUS OF MOTION PICTURES, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Motion Pictures Viewed in Springfield	Motion Pictures Viewed in Columbus	Motion Pictures Viewed in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	10	0	1	14	25
C side of BP	<u>7</u>	<u>4</u>	<u>2</u>	<u>12</u>	<u>25</u>
Total	17	4	3	26	50
<u>Sample B^b</u>					
S side of M	4	6	5	10	25
C side of M	<u>0</u>	<u>11</u>	<u>4</u>	<u>10</u>	<u>25</u>
Total	4	17	9	20	50
<u>Combination Sample No. 1</u>					
	21	21	12	46	100

^aFor map, see Appendix I, Figure 13.

^bFor map, see Appendix II, Figure 26.

TABLE 19
LOCUS OF MOTION PICTURES, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Motion Pictures Viewed in Springfield	Motion Pictures Viewed in Columbus	Motion Pictures Viewed in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	20	0	2	28	50
C side of BP	<u>14</u>	<u>8</u>	<u>4</u>	<u>24</u>	<u>50</u>
Total	34	8	6	52	100
<u>Sample B^b</u>					
S side of M	8	12	10	20	50
C side of M	<u>0</u>	<u>22</u>	<u>8</u>	<u>20</u>	<u>50</u>
Total	8	34	18	40	100
<u>Combination Sample No. 1</u>					
	21	21	12	46	100

^aFor map, see Appendix I, Figure 13.

^bFor map, see Appendix II, Figure 26.

Locus of sporting events

Only about one-eighth of the respondents (3 per cent in Springfield and 9 per cent in Columbus, as shown in the Combination Sample No. 1) stated that they went to the majority of their sporting or athletic events or activities in either Springfield or Columbus.

Of the remaining 88 per cent, the great majority did not have any interest in this form of entertainment and recreation service, or had a slight interest in the local high school athletic teams.

TABLE 20
LOCUS OF SPORTING EVENTS, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Sporting Events Attended in Springfield	Sporting Events Attended in Columbus	Sporting Events Attended in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	2	1	10	12	25
C side of BP	<u>1</u>	<u>1</u>	<u>9</u>	<u>14</u>	<u>25</u>
Total	3	2	19	26	50
<u>Sample B^b</u>					
S side of M	0	3	11	11	25
C side of M	<u>0</u>	<u>4</u>	<u>10</u>	<u>11</u>	<u>25</u>
Total	0	7	21	22	50
<u>Combination Sample No. 1</u>					
	3	9	40	48	100

^aFor map, see Appendix I, Figure 14.

^bFor map, see Appendix II, Figure 27.

TABLE 21

LOCUS OF SPORTING EVENTS, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Sporting Events Attended in Springfield	Sporting Events Attended in Columbus	Sporting Events Attended in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	4	2	20	24	50
C side of BP	<u>2</u>	<u>2</u>	<u>18</u>	<u>28</u>	<u>50</u>
Total	6	4	38	52	100
<u>Sample B^b</u>					
S side of M	0	6	22	22	50
C side of M	<u>0</u>	<u>8</u>	<u>20</u>	<u>22</u>	<u>50</u>
Total	0	14	42	44	100
<u>Combination Sample No. 1</u>					
	3	9	40	48	100

^aFor map, see Appendix I, Figure 14.^bFor map, see Appendix II, Figure 27.

Locus of music events

Over nine-tenths of the respondents did not go to the city for the majority of their music entertainment. Of this group, the majority indicated that they never went to any place of business to be entertained by music. Although some went to high school

and church music functions, the overall results are relatively unimportant in this case.

TABLE 22

LOCUS OF MUSIC EVENTS, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Music Events Attended in Springfield	Music Events Attended in Columbus	Music Events Attended in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	1	0	3	21	25
C side of BP	<u>0</u>	<u>3</u>	<u>2</u>	<u>20</u>	<u>25</u>
Total	1	3	5	41	50
<u>Sample B^b</u>					
S side of M	0	2	6	17	25
C side of M	<u>1</u>	<u>2</u>	<u>6</u>	<u>16</u>	<u>25</u>
Total	1	4	12	33	50
<u>Combination Sample No. 1</u>					
	28	7	17	74	100

^aFor map, see Appendix I, Figure 15.

^bFor map, see Appendix II, Figure 28.

TABLE 23

LOCUS OF MUSIC EVENTS, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Music Events Attended in Springfield	Music Events Attended in Columbus	Music Events Attended in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample A^a</u>				
S side of BP	2	0	6	42	50
C side of BP	<u>0</u>	<u>6</u>	<u>4</u>	<u>40</u>	<u>50</u>
Total	2	6	10	82	100
<hr/>					
	<u>Sample B^b</u>				
S side of M	0	4	12	34	50
C side of M	<u>2</u>	<u>4</u>	<u>12</u>	<u>32</u>	<u>50</u>
Total	2	8	24	66	100
<hr/>					
	<u>Combination Sample No. 1</u>				
	2	7	17	74	100

^aFor map, see Appendix I, Figure 15.^bFor map, see Appendix II, Figure 28.

Locus of restaurants

About one-half (18 per cent in Springfield and 28 per cent in Columbus, as shown in the Combination Sample No. 1) of the people sampled did the majority of their dining out in either Columbus or Springfield. As in the case of shopping goods (of various kinds), the results show a significant portion (34 per cent) of Sample A

went to Springfield, but Columbus attracted a slightly higher percentage (42 per cent) of Sample B. This is the only "category" in which Columbus was found to be a stronger attraction to Sample B than Springfield was to Sample A. Columbus' wider variety of restaurant establishments and the corresponding variety of foods and atmospheres may partially explain its comparatively strong position in this category.

TABLE 24

LOCUS OF RESTAURANTS, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Restaurants Patronized in Springfield	Restaurants Patronized in Columbus	Restaurants Patronized in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	11	2	9	3	25
C side of BP	<u>6</u>	<u>5</u>	<u>5</u>	<u>9</u>	<u>25</u>
Total	17	7	14	12	50
<u>Sample B^b</u>					
S side of M	1	8	14	2	25
C side of M	<u>0</u>	<u>13</u>	<u>9</u>	<u>3</u>	<u>25</u>
Total	1	21	23	5	50
<u>Combination Sample No. 1</u>					
	18	28	37	17	100

^aFor map, see Appendix I, Figure 16.

^bFor map, see Appendix II, Figure 29.

TABLE 25

LOCUS OF RESTAURANTS, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Restaurants Patronized in Springfield	Restaurants Patronized in Columbus	Restaurants Patronized in Other Towns	No Response	Total Number in Sample
<u>Sample A^a</u>					
S side of BP	22	4	18	6	50
C side of BP	<u>12</u>	<u>10</u>	<u>10</u>	<u>18</u>	<u>50</u>
Total	34	14	28	24	100
<u>Sample B^b</u>					
S side of M	2	16	28	4	50
C side of M	<u>0</u>	<u>26</u>	<u>18</u>	<u>6</u>	<u>50</u>
Total	2	42	46	10	100
<u>Combination Sample No. 1</u>					
	18	28	37	17	100

^aFor map, see Appendix I, Figure 16.^bFor map, see Appendix II, Figure 29.

A statistical analysis of the
1964 study

General discussion

The following statistical analysis provides an insight into the results and their significance. This section is devoted to testing (Test I) whether or not Sample A's breaking point,⁷⁵ determined by the formula derived from Reilly's law, was an effective approach to trading area determination. Also, Sample B's geographic midpoint,⁷⁶ determined by dividing the distance between Springfield and Columbus in half, was also tested (Test II) as to its effectiveness in determining trading areas.

Test I

Did the breaking point, as determined by the formula derived from Reilly's Law, provide an effective approach to be used in the determination of trading areas?

Reilly's Law was tested by forming a sample (Sample A) around a breaking point determined by a formula derived from the Law. If the Law worked, the number of people that purchased goods and services in Springfield would equal the number that

⁷⁵See Definition No. 1, page 5.

⁷⁶See Definition No. 6, page 7.

bought in Columbus. The following procedure was used to determine whether or not that equality existed:

i. Null hypothesis. -- H_0 : In the sample formulated around the breaking point (Sample A), there is no difference in the two groups (Springfield buyers and Columbus buyers) in that the proportion of Springfield buyers who buy Group I⁷⁷ items is the same as the proportion of Columbus buyers who buy Group I items, and that this holds true for Group II⁷⁸ and Group III⁷⁹ items, also.

ii. Statistical test. --The chi square test for two independent groups is chosen because the two groups (Springfield and Columbus buyers) are independent, and because the figures under study are frequencies in discrete categories (Group I, Group II, and Group III items).

iii. Significance level. --Let $\alpha = .05$.

iv. Rejection region. --The region of rejection of the null hypothesis consists of all values of chi square (x^2) that are so large that the probability associated with their occurrence is

⁷⁷See General discussion of Group I, pages 52-53.

⁷⁸See General discussion of Group II, page 70.

⁷⁹See General discussion of Group III, page 78.

equal to or less than $\alpha = .05$ (i. e., that the critical value of chi square is equal to or greater than 5.99 for $df = 2$).

v. Decision. -- The pertinent findings are presented in Table 26 below.⁸⁰ This points out that of those who bought Group I items in Sample A, 134 bought them in Springfield and 15 in Columbus. Group II items were purchased 82 times in Springfield and 8 times in Columbus. Group III items were bought 38 times in Springfield and 16 times in Columbus. The "expected" values were computed and shown in the upper left hand corner of the appropriate cells. This was done by multiplying the two marginal totals common to a particular cell, and then dividing this product by the total number of observations (i. e., N) to obtain the expected frequency.

⁸⁰The Group I, Group II, and Group III figures were determined by summing their individual component categories, as shown in Table 26.

TABLE 26
PLACE AND TYPE OF PURCHASE: OBSERVED AND
EXPECTED FREQUENCIES
(Sample A)

Group	Springfield Buyers		Columbus Buyers		
I	129.2	134	19.8	15	= 149
II	78.0	82	12.0	8	= 90
III	46.8	38	7.2	16	= 54
Total		254		39	293

With this data, the expected values were compared with the actual values in order to determine the specific value of chi square (x^2). The computation of chi square (i. e., x^2) for the data in Table 26 is straightforward:

$$x^2 = \sum_{i=1}^r \sum_{j=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

$$x^2 = \frac{(134 - 129.2)^2}{129.2} + \frac{(15 - 19.8)^2}{19.8} + \frac{(82 - 78.0)^2}{78.0} + \frac{(8 - 12.0)^2}{12.0}$$

$$+ \frac{(38 - 46.8)^2}{46.8} + \frac{(16 - 7.2)^2}{7.2}$$

$$x^2 = .18 + 1.16 + .21 + 1.33 + 1.65 + 10.76$$

$$x^2 = 15.29$$

In a table of critical values of chi square, the chi square (x^2) of 15.29 with two degrees of freedom was shown to have a probability associated with its occurrence of less than $\alpha = .01$.⁸¹ Therefore, the null hypothesis is rejected in this case. From observation, it is possible to see that the pulling power of Springfield is much greater than that of Columbus in Sample A.

Test II

Did the geographic midpoint provide an effective approach to be used in the determination of trading areas?

Another method of determining trading areas was tested by forming a sample around the geographic midpoint. If this approach worked, the number of people that bought in Springfield would be equal to the number that bought in Columbus. The following procedure was used to determine whether or not that equality existed:

i. Null hypothesis. -- H_0 : In the sample formulated around the midpoint (Sample B), there is no difference in the two groups

⁸¹The Kolmogorow-Smirnov test was run on the identical data and yielded a maximum difference (D) which, when converted by its formula to a chi square figure, had a $x^2 = 8.37$ with $df = 2$. Although this is much lower than the $x^2 = 15.29$ above, it still had a probability associated with its occurrence of less than $\alpha = .02$. Therefore, this supports the findings of the chi square test.

TABLE 27

DETERMINATION OF TOTAL GROUP I, II, AND III
RESPONSES FOR SAMPLE A (1964)

Group	Springfield Buyers	Columbus Buyers
Group I		
Barber	16	0
Doctor	15	1
Christmas Shopping	32	4
Groceries	8	0
Dress Clothes	30	5
Work and School Clothes	<u>33</u>	<u>5</u>
Total	134	15
Group II		
Television Sets	24	2
Washers	23	2
Automobiles	<u>35</u>	<u>4</u>
Total	82	8
Group III		
Motion Pictures	17	4
Sporting Events	3	2
Music Events	1	3
Restaurants	<u>17</u>	<u>7</u>
Total	38	16

(Springfield buyers and Columbus buyers) in that the proportion of Springfield buyers who buy Group I⁸² items is the same as the proportion of Columbus buyers who buy Group I items, and this holds true for Group II⁸³ and Group III⁸⁴ items, also.

ii. Statistical test. --The chi square test for two independent groups is chosen because the two groups (Springfield and Columbus buyers) are independent, and because the figures under study are frequencies in discrete categories (Group I, Group II, and Group III items).

iii. Significance level. --Let $\alpha = .05$.

iv. Rejection region. --The region of rejection of the null hypothesis consists of all values of chi square (x^2) that are so large with the probability associated with their occurrence is equal to or less than $\alpha = .05$ (i. e., that the critical value of chi square is equal to or greater than 5.99 for $df = 2$).

v. Decision. --The pertinent findings are presented in Table 28 below.⁸⁵ This points out that of those who bought

⁸²See General discussion of Group I, pages 52-53.

⁸³See General discussion of Group II, page 70.

⁸⁴See General discussion of Group III, page 78.

⁸⁵The Group I, Group II, and Group III figures were determined by summing their individual component categories, as shown on page 10.

Group I items in Sample B, 7 bought them in Springfield and 85 in Columbus. Group II items were purchased 7 times in Springfield and 35 times in Columbus. Group III items were bought 6 times in Springfield and 49 times in Columbus. The "expected" values were computed and shown in the upper left hand corner of the appropriate cells. This was done by multiplying the two marginal totals common to a particular cell, and then dividing this product by the total number of observations (i. e., N) to obtain the expected frequency.

TABLE 28
PLACE AND TYPE OF PURCHASE: OBSERVED AND
EXPECTED FREQUENCIES
(Sample B)

Group	Springfield Buyers		Columbus Buyers	
I	9.7	7	82.3	85 = 92
II	4.4	7	37.6	35 = 42
III	5.8	6	49.2	49 = 55
Total	20		169	189

With this data, the expected values were compared with the actual values in order to determine the specific value of chi square (x^2). The computation of chi square (i. e., x^2) for the data in Table 28 is straightforward:

$$x^2 = \sum_{i=1}^r \sum_{j=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

$$x^2 = \frac{(7 - 9.7)^2}{9.7} + \frac{(85 - 82.3)^2}{82.3} + \frac{(7 - 4.4)^2}{4.4} + \frac{(35 - 37.6)^2}{37.6}$$

$$+ \frac{(6 - 5.8)^2}{5.8} + \frac{(49 - 49.2)^2}{49.2}$$

$$x^2 = .76 + .09 + 1.54 + .15 + .01 + .00$$

$$x^2 = 2.55$$

In a table of critical values of chi square, the chi square of 2.55⁸⁶ with two degrees of freedom was shown to have a probability associated with its occurrence somewhere between $\alpha = .30$ and $\alpha = .25$. This would generally be thought of as grounds for not rejecting the null hypothesis. However, as several authors have pointed out, when the expected values in each cell are smaller than minimal, the test may not be considered

⁸⁶The Kolmogorov-Smirnov test was run on the identical data and yielded a maximum difference (D) which, when converted by its formula to a chi square figure, had a $x^2 = 1.21$ with $df = 2$. Although this is somewhat lower than the $x^2 = 2.55$ above, it still had a probability associated with its occurrence of more than $\alpha = .50$. This supports the findings of the chi square analysis.

as proper or meaningful for use.⁸⁷ Due to the fact that all three cells on the Springfield side of the table are 7 or less and the rule of thumb for all chi square testing requires that all cells have a value of five at the extreme minimum, and that figures near five are very questionable, it is the opinion of the author that this test is not effective in this case. By observation one can see that the great differences favoring Columbus here are similar to those favoring Springfield in the analysis of Sample A.

Findings for specific
advertising media

Locus of newspapers⁸⁸

Over 70 per cent (34 of 48) of all subscriptions to the respondents in Sample were to The Springfield Sun. Of the 34, over two-thirds (23 of 34) were sent to people living on the west side (i. e., toward Springfield) of the breaking point. The Columbus Dispatch accounted for 25 per cent (12 of 48) of the newspapers, while the Columbus Citizen-Journal had about 5 per cent of the subscriptions (2 of 48).

⁸⁷See Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., Inc., 1956), p. 110.

⁸⁸The respondents were asked to list the newspaper to which they had subscriptions, and all responses were recorded.

TABLE 29
 DETERMINATION OF TOTAL GROUP I, II, AND III
 RESPONSES FOR SAMPLE B (1964)

Group	Springfield Buyers	Columbus Buyers
Group I		
Barber	0	2
Doctor	1	3
Christmas Shopping	3	31
Groceries	0	3
Dress Clothes	2	25
Work and School Clothes	<u>1</u>	<u>21</u>
Total	7	85
Group II		
Television Sets	1	12
Automobiles	5	14
Washers	<u>1</u>	<u>9</u>
Total	7	35
Group III		
Motion Pictures	4	17
Sporting Events	0	7
Music Events	1	4
Restaurants	<u>1</u>	<u>21</u>
Total	6	49

TABLE 30
LOCUS OF NEWSPAPER SUBSCRIPTIONS IN SAMPLE A

	No. of Subscribers to <u>Springfield Sun</u>	No. of Subscribers to <u>Col. Dis.</u>	No. of Subscribers to <u>Col. Cit. -Jr.</u>
Springfield to Breaking Point	23	5	0
Breaking Point to Columbus	<u>11</u>	<u>7</u>	<u>2</u>
Total Number of Subscribers	34	12	2

Approximately 75 per cent (32 of 43) of the newspaper subscriptions of respondents in Sample B were to the Columbus Dispatch. The Columbus Citizen-Journal accounted for about 15 per cent (7 of 43); the Springfield Sun had the remaining 10 per cent (4 of 43).

TABLE 31
LOCUS OF NEWSPAPER SUBSCRIPTIONS IN SAMPLE B

	No. of Subscribers to <u>Springfield Sun</u>	No. of Subscribers to <u>Col. Dis.</u>	No. of Subscribers to <u>Col. Cit. -Jr.</u>
Springfield to Midpoint	2	16	4
Midpoint to Columbus	<u>2</u>	<u>16</u>	<u>3</u>
Total Number of Subscribers	4	32	7

Locus of television viewing⁸⁹

All Columbus television stations (i. e., Channels 4, 6, and 10) were more popular than the one in Dayton (i. e., Channel 7) in Sample A. There were twenty-three responses for Channel 10, twenty-two for Channel 4, fifteen for Channel 6, and only eleven for Channel 7. In other words, Columbus had three of the four television stations viewed by the respondents, and accounted

⁸⁹The respondents were asked to list their favorite television station. All responses were recorded, including those cases where more than one station was given by an individual respondent.

for approximately 85 per cent (60 of 71) of the total responses in a sample area lying eight to eighteen miles east of Springfield and twenty-six to thirty-six miles west of Columbus.

TABLE 32
LOCUS OF TELEVISION VIEWING IN SAMPLE A

	Columbus Channel 4	Columbus Channel 6	Dayton Channel 7	Columbus Channel 10
Springfield to Breaking Point	11	8	8	11
Breaking Point to Columbus	<u>11</u>	<u>7</u>	<u>3</u>	<u>12</u>
Total Audience	22	15	11	23

There were no responses in Sample B for the Dayton station (i. e., Channel 7). Channel 6 in Columbus, which was the least-viewed Columbus station in Sample A, was the most popular in Sample B with twenty-seven respondents listing it as a favorite. There were twenty-four responses for Channel 10, and eighteen responses for Channel 4. Channel 4 actually had four less responses in the Sample B area which, as has been pointed out, is located nearer to Columbus than is the Sample A area. This

may be partially due to topographical reasons, since interferences in sound waves can be caused by differences in land elevations.

TABLE 33
LOCUS OF TELEVISION VIEWING IN SAMPLE B

	Columbus Channel 4	Columbus Channel 6	Dayton Channel 7	Columbus Channel 10
Springfield to Midpoint	11	14	0	11
Midpoint to Columbus	<u>7</u>	<u>13</u>	<u>0</u>	<u>13</u>
Total Audience	18	27	0	24

Locus of radio listening⁹⁰

Of the top six radio stations, measured by the size of audience, WLW in Cincinnati and WCOL in Columbus had over 50 per cent ($16/43+8/43$) of the listeners in Sample A. The two Springfield stations (i. e., WIZE and WBLY) accounted for less than 30 per cent ($7/43+5/43$) of the listening audience. The author feels that there are certain reasons why the sample of people

⁹⁰The respondents were asked to list their favorite radio stations. All responses were recorded, including those in which more than one station was offered by an individual respondent.

much nearer Springfield didn't listen to the closer and more local stations, namely:

1. The Cincinnati station (WLW) and the Columbus stations were more powerful (i. e., more wattage).

2. The "disc jockeys" and commentators of the Springfield stations weren't as popular.

3. There is more financial support of the larger Columbus stations allowing for better programs, personnel, and general sound and tone.

The results show that all area stations (i. e., those from Springfield and Columbus) had larger individual audiences from the breaking point to the station's city, which is logical.

TABLE 34

LOCUS OF RADIO LISTENING IN SAMPLE A

	No. of Listeners					
	WLW	WCOL	WIZE	WBLV	WTVN	WRFD
Springfield to Breaking Point	6	3	6	4	1	0
Breaking Point to Columbus	<u>10</u>	<u>5</u>	<u>1</u>	<u>1</u>	<u>3</u>	<u>3</u>
Total Listening Audience	16	8	7	5	4	3

In Sample B, none of the fifty respondents listed Springfield stations as favorite ones. Radio listening popularity differed a great deal from that of Sample A. Of the top four stations' total audience, Columbus radio stations were dominant, with WCOL having 45-50 per cent, WTVN having 30-35 per cent, WRFD having 10-15 per cent, and Cincinnati's WLW having 5-10 per cent. In other words, Columbus stations were dominant in listening popularity. No other stations, outside of the four mentioned above, had over one respondent listing it as a favorite station.⁹¹

TABLE 35

LOCUS OF RADIO LISTENING IN SAMPLE B

	No. of Listeners			
	WLW	WTVN	WCOL	WRFD
Springfield to Midpoint	2	10	7	1
Midpoint to Columbus	<u>1</u>	<u>3</u>	<u>12</u>	<u>4</u>
Total No. of Listeners	3	13	19	5

⁹¹Only those stations mentioned more than once in either specific sample were considered in the analysis presented above. For a discussion and map of the variability in coverage due to time differences, see John S. Wright and Daniel S. Warner, Advertising (New York: McGraw-Hill Book Co., Inc., 1962), p. 187.

Relationships between advertising
media and the purchasing of
goods and services

For purposes of the following analysis, certain categories of goods and services will be excluded because there are not more than ten per cent of the people in either Sample A or Sample B who do the majority of their purchasing of the specific commodity or service in either Springfield or Columbus. Advertising does not influence demand creation much in these cases. These categories are: barbers (i. e., haircuts), doctors (i. e., medical service), sporting events, and music events.

Table 36 shows the shopping habits of the respondents in both Sample A and Sample B for the nine other product or service groups.

Newspapers⁹²

In relating the purchasing or shopping habits of the people surveyed to newspapers, certain meaningful relationships resulted. Table 37 shows the circulations of the Columbus and Springfield newspapers in both Sample A and Sample B.

⁹²See Tables 30 and 31 for data concerning newspaper circulations in the surveyed areas.

TABLE 36
LOCUS OF SHOPPING HABITS FOR PARTICULAR GOODS AND SERVICES
(Percentage of Purchasers to Total Number of Respondents for
Specific Samples)

	Percentage of Respondents in Sample A Pur- chasing in Springfield	Percentage of Respondents in Sample A Pur- chasing in Columbus	Percentage of Respondents in Sample B Pur- chasing in Springfield	Percentage of Respondents in Sample B Pur- chasing in Columbus
<u>Convenience Goods</u>				
Groceries	16	0	0	6
<u>Shopping Goods</u>				
(non-durable)				
Work and School Clothes	66	10	2	42
(durable)				
Television Sets	48	4	2	24
Washers	46	4	2	18
<u>Specialty Goods</u>				
(non-durable)				
Dress Clothes	60	10	4	50
(durable)				
Automobiles	70	8	10	28
<u>Services</u>				
Motion Pictures	34	8	8	34
Restaurants	34	14	2	42
<u>Overall Measure</u>				
Christmas Shopping	64	8	6	62

TABLE 37

LOCUS OF NEWSPAPER SUBSCRIPTIONS
(Percentage of Subscribers to Total
Number of Respondents for
Specific Samples)

<u>Springfield Sun</u> Subscribers (as percentage of Sample A respondents)	<u>Springfield Sun</u> Subscribers (as percentage of Sample B respondents)	<u>Cols. Dispatch</u> and <u>Cit. -Jrnl.</u> Subscribers (as percentage of Sample A respondents)	<u>Cols. Dispatch</u> and <u>Cit. Jrnl.</u> Subscribers (as percentage of Sample B respondents)
68%	8%	28%	78%

The figures shown in Table 36 relate directly to those in Table 37. Springfield sellers attract buyers better in Sample A, while Columbus sells to more of the respondents in Sample B. The Springfield and Columbus newspapers also have larger circulations in the sample located nearest to each of them. It is interesting to note that although Columbus sellers and newspapers dominate Sample B, the proportion of purchasers patronizing Columbus merchants is only about one-half that of those respondents in Sample A purchasing in Springfield. This is partially due to the distance factor. The "average" Sample B respondent is still twenty-two miles (i. e., at the geographic midpoint) from Columbus after he reaches Highway 40, while the "average" Sample A

respondent is only thirteen miles (i. e., at the breaking point) from Springfield after he reaches Highway 40.

Consideration should also be given to the fact that the number of respondents traveling to Columbus or Springfield for various consumer goods is proportionately more as one moves from convenience to shopping to specialty goods (see Table 36). This supports the definitions of these three classes of consumer goods, which state that the least effort will be exerted and the shortest distance will be traveled for convenience goods, with more effort exerted and more distance traveled for shopping goods and specialty goods, respectively. Also, customers will travel further distances for goods and services as the number of such items that are available at different trading centers is increased.⁹³

Radio⁹⁴

Less than one-fourth of the respondents in Sample A listen to one of the two Springfield stations (i. e., WBLY and WIZE) the most. These Springfield stations have little or no audience in

⁹³Huff, loc. cit., pp. 85-86.

⁹⁴See Tables 34 and 35 for data concerning radio listening audiences for the surveyed areas.

Sample B. Only two Columbus stations (i. e. , WCOL and WTVN) have an audience of any size. If combined, they are listened to most by about 25 per cent of the respondents in Sample A and about 65 per cent in Sample B. The combined audience of these two Columbus radio stations is quite similar to that of the two Columbus newspapers.

The majority of local radio stations have very small listening audiences. This is partially because of the fact that many of them are aimed at special interest groups or classes of people. It seems fairly apparent from the results that WCOL and WTVN are the two logical selections for the majority of sellers advertising through this medium to buyers in the surveyed areas.

Television⁹⁵

The Dayton⁹⁶ television station (i. e. , Channel 7) actually is viewed less than each of the three Columbus stations in Sample A, and had no audience in Sample B at all. It would be a very poor medium for Springfield sellers in advertising to the surveyed areas. The Columbus stations, on the other hand, are strikingly similar in their total audience for respondents in both Samples A

⁹⁵WLW in Cincinnati will not be included in the analysis.

⁹⁶See Tables 32 and 33 for data concerning television viewing audiences for the surveyed areas.

and B. Of the 100 respondents, 40 (i. e., 22 in Sample A and 18 in Sample B) mentioned Channel 4 as one of their favorites, 42 (i. e., 15 in Sample A and 27 in Sample B) listed Channel 6, and 47 (i. e., 23 in Sample A and 24 in Sample B) named Channel 10. In other words, of the 129 total responses, about 47 per cent (i. e., 60 divided by 129) were in Sample A, which shows that the audience diminishes only slightly with distance, in this case.

Because of the Dayton station's extremely small audience, and the relatively good but equal popularity of the Columbus stations, it is difficult to relate the purchasing habits of the respondents in either or both Sample A and Sample B to this advertising medium.

CHAPTER V

FINDINGS FOR JULY, 1967 STUDY

(SAMPLE AA AND SAMPLE BB)

Key to analyses

The following information will be helpful in understanding the analyses of the various categories of goods, which will begin on page 112:

1. The thirteen goods and services analyzed will be grouped into three sections as follows:

Group I (selected convenience goods and services, and clothing)

- Haircuts
- Medical services
- Christmas shopping
- Groceries
- Dress clothes
- Work and school clothes

Group II (selected shopping and specialty goods)

- Television sets
- Washers
- Automobiles

Group III (selected shopping and specialty services)

Motion pictures
Sporting events
Music events
Restaurants

2. The presentation of information about each category contains the following:

- a. Table summarizing sample responses
- b. Comment on category

3. Reference will often be made to "Sample AA" and "Sample BB." These samples are discussed under Definition No. 9 and Definition No. 10. The "Combination Sample No. 2" simply refers to the combination of the two samples mentioned above (see Definition No. 3).

4. Each discussion will make reference to a map of respondent locations and preferences that can be found in an appendix.

Findings for specific goods and services: Group I

General discussion of Group I

Group I basically consists of "convenience type goods and services, or those that people desire immediately, frequently, and will exert a minimum amount of effort in obtaining. The following

goods and services have been included in this group (as compared to the other two groups) because they most nearly meet the above stated criteria: haircuts, medical services, Christmas shopping,⁹⁷ groceries, dress clothes,⁹⁸ and work and school clothes.⁹⁹

Locus of haircuts

Approximately one-fourth (20% in Springfield and 4% in Columbus, as shown in the Combination Sample No. 2) of the people interviewed stated that their barbers were located in Springfield or Columbus. The majority of these were located in Sample AA and received their haircuts from Springfield barbers. The majority of these men had jobs located in Springfield or its adjacent areas.

The results show that the difference in the skills, personalities, and other characteristics and traits of barbers was

⁹⁷Many items bought for Christmas are purchased locally. Although the majority of the money on this category was spent in the two cities, most of the goods purchased there were necessities to these rural people and were not considered shopping or specialty goods.

⁹⁸This category is often considered a shopping good. However, considering the particular group sampled, clothing should be considered as an item which is bought with a minimum amount of effort.

⁹⁹Ibid.

not important enough to most people to warrant a special trip from the rural areas into the cities. The service of haircutting may be considered somewhat of a "convenience" because those people who desire it want it immediately, frequently, and will exert a minimum amount of effort in getting it relative to other services.

Several significant trends can be seen in this field, which may place more significance on it in the future. First, hair-cutting is becoming more an art. Special barber and beautician schools have been established to teach the special skills required. Second, the prices of haircutting and related services are rising rapidly. This means that more income is being received by barbers and that more is being spent by the consuming public. Third, new developments and/or improvements have taken place in the field. The styling of hair is becoming popular for men as well as women now. Also, the dyeing of hair is becoming popular. Other improvements can be seen in the areas of growing and straightening of hair. Fourth, barber shops are becoming better equipped. The barber chairs are better constructed and more attractive, making it much more enjoyable for the one having the haircut.

TABLE 38
LOCUS OF HAIRCUT PURCHASES, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Haircuts Obtained in Springfield	Haircuts Obtained in Columbus	Haircuts Obtained in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample AA^a</u>				
S side of BP	13	0	8	4	25
C side of BP	<u>6</u>	<u>0</u>	<u>14</u>	<u>5</u>	<u>25</u>
Total	19	0	22	9	50
<hr/>					
	<u>Sample BB^b</u>				
S side of M	1	3	19	2	25
C side of M	<u>0</u>	<u>1</u>	<u>23</u>	<u>1</u>	<u>25</u>
Total	1	4	42	3	50
<hr/>					
	<u>Combination Sample No. 2</u>				
	20	4	64	12	100

^aFor map, see Appendix III, Figure 30.

^bFor map, see Appendix IV, Figure 43.

TABLE 39

LOCUS OF HAIRCUT PURCHASES, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Haircuts Obtained in Springfield	Haircuts Obtained in Columbus	Haircuts Obtained in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	26	0	16	8	50
C side of BP	<u>12</u>	<u>0</u>	<u>28</u>	<u>10</u>	<u>50</u>
Total	38	0	44	18	100
<u>Sample BB^b</u>					
S side of M	2	6	38	4	50
C side of M	<u>0</u>	<u>2</u>	<u>46</u>	<u>2</u>	<u>50</u>
Total	2	8	84	6	100
<u>Combination Sample No. 2</u>					
	20	4	64	12	100

^aFor map, see Appendix III, Figure 30.^bFor map, see Appendix IV, Figure 43.

Locus of medical services

Approximately 80 per cent of the people questioned pointed out that their medical doctors were located outside the two cities in question, primarily in the local rural areas. Concerning the remaining one-fifth, the majority were located in Sample AA and secured their medical services in Springfield.

Several possible explanations may be given concerning the results. A factor influencing respondent behavior may be the relatively low average incomes of the respondents. By going to local doctors the people saved not only the transportation and time expense of driving into the cities, but usually had their medical services, per se, provided at a lower cost (assuming rural doctors charge less than urban ones for the same services). Because medical work is often needed quickly, as in the cases of accidents, child delivery, and other emergency situations, travel time often is important enough for favoring local doctors.

Although there are appreciable differences in the variety of medical services and skills offered by medical doctors, only one-fifth (as discussed above) felt that the difference was great or significant enough for them to travel to Springfield or Columbus for the majority of their medical work. It should also be realized that a great number of these respondents stating that they had local doctors often added that they rarely, if ever, used their doctors unless absolutely necessary.

TABLE 40

LOCUS OF MEDICAL SERVICES, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Medical Services Obtained in Springfield	Medical Services Obtained in Columbus	Medical Services Obtained in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	12	0	12	1	25
C side of BP	<u>4</u>	<u>0</u>	<u>20</u>	<u>1</u>	<u>25</u>
Total	16	0	32	2	50
<u>Sample BB^b</u>					
S side of M	0	3	22	0	25
C side of M	<u>0</u>	<u>2</u>	<u>22</u>	<u>1</u>	<u>25</u>
Total	0	5	44	1	50
<u>Combination Sample No. 2</u>					
	16	5	76	3	100

^aFor map, see Appendix III, Figure 31.^bFor map, see Appendix IV, Figure 44.

TABLE 41

LOCUS OF MEDICAL SERVICES, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Medical Services Obtained in Springfield	Medical Services Obtained in Columbus	Medical Services Obtained in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	24	0	24	2	50
C side of BP	<u>8</u>	<u>0</u>	<u>40</u>	<u>2</u>	<u>50</u>
Total	32	0	64	4	100
<u>Sample BB^b</u>					
S side of M	0	6	44	0	50
C side of M	<u>0</u>	<u>4</u>	<u>44</u>	<u>2</u>	<u>50</u>
Total	0	10	88	2	100
<u>Combination Sample No. 2</u>					
	16	5	76	3	100

^aFor map, see Appendix III, Figure 31.^bFor map, see Appendix IV, Figure 44.

Locus of Christmas shopping

This particular inclusive type of purchasing category of goods is extremely interesting as a measure of where shoppers will travel when their primary goal is to acquire a large number and variety of consumer goods at a specific time, particularly of the shopping and specialty classes.

Nearly five-eighths (32/50) of the respondents in Sample AA bought in Springfield, while only a slightly higher number of Sample BB respondents used Columbus to do the majority of their Christmas shopping.

Due to a greater amount of spending during this season, the people sampled seemingly were willing to travel greater distances. Also, people were willing to travel further because:

1. The variety and assortment of goods offered in the cities appears to become more important in the fulfillment of their needs. The people are in the market for many products in many lines of trade.
2. There is a probability that because of quantity buying and correspondingly greater spending the travel time and expense can be spread over a greater number and amount of purchase.
3. It provides an opportunity for families to go to the "big city."

Another reason why so many people would do much of this type of shopping in the cities is the fact that almost all of the shopping centers and department stores providing a great number of goods in a given location were located in either Springfield or Columbus. Many of the respondents shopped at the Great Western Shopping Center and at stores such as Lazarus and Schottenstein's

in Columbus. In Springfield, much of the Christmas shopping was done at stores such as Wren's and Sears Roebuck & Co.

TABLE 42

LOCUS OF CHRISTMAS SHOPPING, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Christmas Shopping Done in Springfield	Christmas Shopping Done in Columbus	Christmas Shopping Done in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample AA^a</u>				
S side of BP	19	2	3	1	25
C side of BP	<u>13</u>	<u>7</u>	<u>3</u>	<u>2</u>	<u>25</u>
Total	32	9	6	3	50
<hr/>					
	<u>Sample BB^b</u>				
S side of M	3	16	6	0	25
C side of M	<u>0</u>	<u>18</u>	<u>7</u>	<u>0</u>	<u>25</u>
Total	3	34	13	0	50
<hr/>					
	<u>Combination Sample No. 2</u>				
	35	43	19	3	100
<hr/>					

^aFor map, see Appendix III, Figure 32.

^bFor map, see Appendix IV, Figure 45.

TABLE 43

LOCUS OF CHRISTMAS SHOPPING, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Christmas Shopping Done in Springfield	Christmas Shopping Done in Columbus	Christmas Shopping Done in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample AA^a</u>				
S side of BP	38	4	6	2	50
C side of BP	<u>26</u>	<u>14</u>	<u>6</u>	<u>4</u>	<u>50</u>
Total	64	18	12	6	100
<hr/>					
	<u>Sample BB^b</u>				
S side of M	6	32	12	0	50
C side of M	<u>0</u>	<u>36</u>	<u>14</u>	<u>0</u>	<u>50</u>
Total	6	68	26	0	100
<hr/>					
	<u>Combination Sample No. 2</u>				
	35	43	19	3	100
<hr/>					

^aFor map, see Appendix III, Figure 32.^bFor map, see Appendix IV, Figure 45.

Of the three-tenths of the people sampled that did their Christmas shopping locally (in neither Columbus nor Springfield), many did not have adequate transportation available to them. Also, those with small incomes may have felt that the amount they had to spend did not warrant a separate trip into the city.

Locus of grocery shopping

Approximately one-tenth (7 per cent in Springfield and 4 per cent in Columbus, as shown in the Combination Sample No. 2) of the people sampled bought their groceries in the city, and the majority of these respondents lived in the Sample AA area and worked in Springfield. Groceries are generally classified in the "convenience good" category (those goods which are purchased immediately, frequently, and with a minimum amount of effort), and the results are, therefore, fairly understandable and reasonable.

In the Sample AA area, Shoemaker's, a supermarket in South Vienna, Ohio, appeared to be attracting most of the grocery trade. This establishment offered goods which were comparable in price and in selection to those found in the city. In Sample BB, grocery stores in London, Ohio offered goods that were comparable to those found in the city stores, for all practical purposes.

TABLE 44

LOCUS OF GROCERY SHOPPING, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Grocery Shopping Done in Springfield	Grocery Shopping Done in Columbus	Grocery Shopping Done in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	4	0	21	0	25
C side of BP	<u>2</u>	<u>0</u>	<u>23</u>	<u>0</u>	<u>25</u>
Total	6	0	44	0	50
<u>Sample BB^b</u>					
S side of M	1	3	21	0	25
C side of M	<u>0</u>	<u>1</u>	<u>24</u>	<u>0</u>	<u>25</u>
Total	1	4	45	0	50
<u>Combination Sample No. 2</u>					
	7	4	89	0	100

^aFor map, see Appendix III, Figure 36.^bFor map, see Appendix IV, Figure 49.

TABLE 45

LOCUS OF GROCERY SHOPPING, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Grocery Shopping Done in Springfield	Grocery Shopping Done in Columbus	Grocery Shopping Done in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	8	0	42	0	50
C side of BP	<u>4</u>	<u>0</u>	<u>46</u>	<u>0</u>	<u>50</u>
Total	12	0	88	0	100
<u>Sample BB^b</u>					
S side of M	2	6	42	0	50
C side of M	<u>0</u>	<u>2</u>	<u>48</u>	<u>0</u>	<u>50</u>
Total	2	8	90	0	100
<u>Combination Sample No. 2</u>					
	7	4	89	0	100

^aFor map, see Appendix III, Figure 36.^bFor map, see Appendix IV, Figure 49.Locus of dress clothes
purchases

A great number of people stated that they bought the majority of their dress or formal clothing in either Springfield or Columbus. Three-fifths of Sample AA's respondents bought in Springfield while an even greater number of Sample BB bought in Columbus. Very little overlapping existed in the trading areas.

Considering those people who did not buy most of their dress clothes in the cities, many had low incomes and, therefore, could not afford the particular type of clothing. Others presumably felt that there was little need or opportunity to use this class of clothing. Of those purchasing dress clothes outside the two cities, the great majority, particularly in Sample BB, bought goods from clothing stores located in London, Ohio.

The clothing type of shopping good, particularly of the dress or formal kind, is much less common to rural than urban people in general. This means that although the majority of all respondents traveled to the city, or at least said they did, they will, over the same period of time, probably purchase less per capita than people living in the city. Also, it is questionable as to whether the purchase of "dress clothes" was anything more than good work and school clothes. There were extremely few cases of people who had either the money or desire to purchase this type of clothing.

TABLE 46
LOCUS OF DRESS CLOTHES PURCHASES,
ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Dress Clothes Purchased in Springfield	Dress Clothes Purchased in Columbus	Dress Clothes Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	20	0	5	0	25
C side of BP	<u>10</u>	<u>8</u>	<u>6</u>	<u>1</u>	<u>25</u>
Total	30	8	11	1	50
<u>Sample BB^b</u>					
S side of M	1	15	9	0	25
C side of M	<u>0</u>	<u>18</u>	<u>7</u>	<u>0</u>	<u>25</u>
Total	1	33	16	0	50
<u>Combination Sample No. 2</u>					
	31	41	27	1	100

^aFor map, see Appendix III, Figure 37.

^bFor map, see Appendix IV, Figure 50.

TABLE 47

LOCUS OF DRESS CLOTHES PURCHASES, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Dress Clothes Purchased in Springfield	Dress Clothes Purchased in Columbus	Dress Clothes Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	40	0	10	0	50
C side of BP	<u>20</u>	<u>16</u>	<u>12</u>	<u>2</u>	<u>50</u>
Total	60	16	22	2	100
<u>Sample BB^b</u>					
S side of M	2	30	18	0	50
C side of M	<u>0</u>	<u>36</u>	<u>14</u>	<u>0</u>	<u>50</u>
Total	2	66	32	0	100
<u>Combination Sample No. 2</u>					
	31	41	27	1	100

^aFor map, see Appendix III, Figure 37.^bFor map, see Appendix IV, Figure 50.

Locus of work and school clothes

The Springfield and Columbus trading areas for work and school clothes are somewhat similar to those for areas for dress or formal clothes. Although it seems illogical to have similar trading areas with dress clothes usually considered to have higher unit values and more shopping time involved in their selection than

work and school clothes, the results oppose this idea. The seemingly incorrect results may possibly be due to an inadequacy in the questionnaire, namely, both items were listed together. With one immediately following the other, certain people may have answered the same for both questions because the same "general" good was involved.

TABLE 48
LOCUS OF WORK AND SCHOOL CLOTHES PURCHASES,
ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	W. and S. Clothes Purchased in Springfield	W. and S. Clothes Purchased in Columbus	W. and S. Clothes Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	23	0	2	0	25
C side of BP	<u>14</u>	<u>8</u>	<u>3</u>	<u>0</u>	<u>25</u>
Total	37	8	5	0	50
<u>Sample BB^b</u>					
S side of M	2	13	10	0	25
C side of M	<u>0</u>	<u>17</u>	<u>8</u>	<u>0</u>	<u>25</u>
Total	2	30	18	0	50
<u>Combination Sample No. 2</u>					
	39	38	23	0	100

^aFor map, see Appendix III, Figure 38.

^bFor map, see Appendix IV, Figure 51.

TABLE 49

LOCUS OF WORK AND SCHOOL CLOTHES PURCHASES,
PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	W. and S. Clothes Purchased in Springfield	W. and S. Clothes Purchased in Columbus	W. and S. Clothes Purchased in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample AA^a</u>				
S side of BP	46	0	4	0	50
C side of BP	<u>28</u>	<u>16</u>	<u>6</u>	<u>0</u>	<u>50</u>
Total	74	16	10	0	100
<hr/>					
	<u>Sample BB^b</u>				
S side of M	4	26	20	0	50
C side of M	<u>0</u>	<u>34</u>	<u>16</u>	<u>0</u>	<u>50</u>
Total	4	60	36	0	100
<hr/>					
	<u>Combination Sample No. 2</u>				
	39	38	23	0	100

^aFor map, see Appendix III, Figure 38.

^bFor map, see Appendix IV, Figure 51.

Findings of specific goods and
services: Group II

General discussion of Group II

Group II basically consists of shopping and specialty types of goods, or those that people don't generally desire immediately

and frequently. They will exert more than a minimum amount of effort in obtaining them. The following goods have been selected for this group (as compared to the other two groups) because they most nearly meet the above stated criteria: television sets, washers, and automobiles.

Locus of television set purchases

There were exactly two-fifths (25 per cent in Springfield and 15 per cent in Columbus, as shown in the Combination Sample No. 2) of the respondents that stated that they purchased their last television sets in Springfield or Columbus.

It is interesting to note that there is a Springfield advantage over Columbus by almost a 5:3 ratio (i. e. , 25:15) of trading area "strength" in television sets compared to over a 5:6 Springfield disadvantage (35:43) in Christmas shopping. A reason for so many more people buying their television sets in Springfield than Columbus and the great shift toward doing the majority of their Christmas shopping in Columbus may be due to the fact that people buying television sets know what they are looking for and where to find it, while those doing Christmas shopping have less specific shopping information prior to their trips.

Of the total number of people sampled three-fifths of them stated that they did not purchase their last television sets in Springfield or Columbus. Of these, the majority of the sets were purchased from friends, relatives, or dealers located in London, Ohio. City merchants offered the advantages of more dealers, greater diversity of models, styles, colors and sizes, as well as better bargains due to more competition and larger quantity buying. Also, certain additional amusements, entertainment services, and various kinds of stores located in the vicinity and not found in the rural areas were beneficial to the purchaser if he dealt in the larger cities. Local purchase, on the other hand, seemed to offer advantages of giving more personal service, certain benefits accruing from personal acquaintances, and usually less high pressure salesmanship.

TABLE 50
LOCUS OF TELEVISION SET PURCHASES,
ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Television Sets Purchased in Springfield	Television Sets Purchased in Columbus	Television Sets Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	17	1	7	0	25
C side of BP	<u>8</u>	<u>3</u>	<u>12</u>	<u>2</u>	<u>25</u>
Total	25	4	19	2	50
<u>Sample BB^b</u>					
S side of M	0	3	21	1	25
C side of M	<u>0</u>	<u>8</u>	<u>17</u>	<u>0</u>	<u>25</u>
Total	0	11	38	1	50
<u>Combination Sample No. 2</u>					
	25	15	57	3	100

^aFor map, see Appendix III, Figure 33.

^bFor map, see Appendix IV, Figure 46.

TABLE 51
LOCUS OF TELEVISION SET PURCHASES,
PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Television Sets Purchased in Springfield	Television Sets Purchased in Columbus	Television Sets Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	34	2	14	0	50
C side of BP	<u>16</u>	<u>6</u>	<u>24</u>	<u>4</u>	<u>50</u>
Total	50	8	38	4	100
<u>Sample BB^b</u>					
S side of M	0	6	42	2	50
C side of M	<u>0</u>	<u>16</u>	<u>34</u>	<u>0</u>	<u>50</u>
Total	0	22	76	2	100
<u>Combination Sample No. 2</u>					
	25	15	57	3	100

^aFor map, see Appendix III, Figure 33.

^bFor map, see Appendix IV, Figure 46.

Locus of washer purchases

The results for this durable shopping good vary only slightly from the ones found in the category of television sets.

It is assumed that the trading areas are affected by the same factors in somewhat the same way as those given for television sets.

TABLE 52
LOCUS OF WASHER PURCHASES,
ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Washers Purchased in Springfield	Washers Purchased in Columbus	Washers Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	17	0	6	2	25
C side of BP	<u>4</u>	<u>3</u>	<u>15</u>	<u>3</u>	<u>25</u>
Total	21	3	21	5	50
<u>Sample BB^b</u>					
S side of M	1	2	20	2	25
C side of M	<u>0</u>	<u>6</u>	<u>15</u>	<u>4</u>	<u>25</u>
Total	1	8	35	6	50
<u>Combination Sample No. 2</u>					
	22	11	56	11	100

^aFor map, see Appendix III, Figure 34.

^bFor map, see Appendix IV, Figure 47.

TABLE 53

LOCUS OF WASHER PURCHASES, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Washers Purchased in Springfield	Washers Purchased in Columbus	Washers Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	34	0	12	4	50
C side of BP	<u>8</u>	<u>6</u>	<u>30</u>	<u>6</u>	<u>50</u>
Total	42	6	42	10	100
<u>Sample BB^b</u>					
S side of M	2	4	40	4	50
C side of M	<u>0</u>	<u>12</u>	<u>30</u>	<u>8</u>	<u>50</u>
Total	2	16	70	12	100
<u>Combination Sample No. 2</u>					
	22	11	56	11	100

^aFor map, see Appendix III, Figure 34.^bFor map, see Appendix IV, Figure 47.

Locus of automobile purchases

The great majority of automobiles were bought outside Springfield and Columbus. Concerning the 34 per cent (i. e., 68 out of 200) bought in the cities, the majority were purchased in Springfield by respondents in Sample AA. Almost three-fourths of all cars purchased in one of the metropolitan areas were bought

by Sample AA respondents in Springfield. This can partially be explained by the reasons mentioned in the discussion on television sets.

Concerning local automobile sales, London, Ohio automobile dealers are becoming very progressive and are carrying on extensive promotional campaigns. Fresch's Chevrolet and Rod Bell's Ford dealerships are advertising more over radio, in local newspapers, and are using more billboards. Both firms have relatively large sales volumes and can compete successfully with dealers in the larger cities due to the customer often feeling that there is less pressure selling in local communities, more personalized service, benefits resulting from the personal acquaintances that are much more possible. Also, the buyer feels that he has better knowledge of the reputation and past service record of any particular dealer. Coupled with these reasons is the fact that taxes are less, overhead is lower, and costs of labor and general standards of living are usually less. Both dealers mentioned above have gained the confidence with the public that they can compete with other competition on the bases of price, service, and general repair work.

A great number of people purchased from relatives or other individuals, as in the cases of television sets and washers.

This means that although the trading areas for city automobile dealers may be quite wide (typical of a shopping and/or specialty good, and particularly one of high unit value), their coverage within the area will continue to be relatively weak as long as people continue to buy from each other as much as they are doing presently.

TABLE 54
LOCUS OF AUTOMOBILE PURCHASES^a

Legend: BP = Breaking Point M = Midpoint

	Autos Purchased in Springfield	Autos Purchased in Columbus	Autos Purchased in Other Towns	No Response	Total Number in Sample
<u>Sample AA^b</u>					
S side of BP	15.5	0	9.5	0	25
C side of BP	9.0	1	13.0	2	25
Total	24.5	1.0	22.5	2	50
<u>Sample BB^c</u>					
S side of M	1.5	2.5	20.0	1	25
C side of M	.5	4.0	20.5	0	25
Total	2.0	6.5	40.5	1	50
<u>Combination Sample No. 2</u>					
	26.5	7.5	63.0	3	100

^aFigures are expressed in percentages (found by dividing the responses, which were twice as great in this case, by two). Therefore, a table of absolute values was not constructed for this category only.

^bFor map, see Appendix III, Figure 35.

^cFor map, see Appendix IV, Figure 48.

Findings of specific goods and services: Group III

General discussion of Group III

Group III consists of "shopping or specialty" type services, or those that aren't desired immediately and frequently. People will exert more than a minimum amount of effort to obtain them. The following services have been included in this group (as compared to the other two groups) because they most nearly meet the above stated criteria: motion pictures, sporting events, music events, and restaurants.

Locus of motion pictures

There were exactly half (25 per cent in Springfield and 25 per cent in Columbus, as shown in the Combination Sample No. 2) of the people sampled who stated that they traveled to the cities most of the time when they wanted to see a motion picture. Of those going to movies in the cities, 48 per cent were in Sample AA and went to Springfield, while 44 per cent were in Sample BB and traveled to Columbus. In other words, less than 10 per cent of those viewing movies in the cities were Sample AA respondents going to Columbus and Sample BB respondents going to Springfield.

Concerning the remaining half of the respondents, the great majority of this group indicated that they never went to see a movie, primarily due to the fact that they felt their television sets would adequately suffice.

TABLE 55
LOCUS OF MOTION PICTURES, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Motion Pictures Viewed in Springfield	Motion Pictures Viewed in Columbus	Motion Pictures Viewed in Other Towns	No Response	Total Number in Sample
<hr/>					
	<u>Sample AA^a</u>				
S side of BP	15	1	0	9	25
C side of BP	<u>9</u>	<u>2</u>	<u>1</u>	<u>13</u>	<u>25</u>
Total	24	3	1	22	50
<hr/>					
	<u>Sample BB^b</u>				
S side of M	1	8	3	13	25
C side of M	<u>0</u>	<u>14</u>	<u>4</u>	<u>7</u>	<u>25</u>
Total	1	22	7	20	50
<hr/>					
	<u>Combination Sample No. 2</u>				
	25	25	8	42	100

^aFor map, see Appendix III, Figure 39.

^bFor map, see Appendix IV, Figure 52.

TABLE 56

LOCUS OF MOTION PICTURES, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Motion Pictures Viewed in Springfield	Motion Pictures Viewed in Columbus	Motion Pictures Viewed in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	30	2	0	18	50
C side of BP	<u>18</u>	<u>4</u>	<u>2</u>	<u>26</u>	<u>50</u>
Total	48	6	2	44	100
<u>Sample BB^b</u>					
S side of M	2	16	6	26	50
C side of M	<u>0</u>	<u>28</u>	<u>8</u>	<u>14</u>	<u>50</u>
Total	2	44	14	40	100
<u>Combination Sample No. 2</u>					
	25	25	8	42	100

^aFor map, see Appendix III, Figure 39.^bFor map, see Appendix IV, Figure 52.

Locus of sporting events

The great majority of the respondents were not greatly interested in this form of entertainment and recreation service with the minor exception of local high school football, basketball, and baseball teams. This is partially due to the fact that the great majority of the people sampled had little or no interest in athletics

or sporting events. Also, even though some of the respondents stated they would enjoy being spectators more often, they didn't have the time or money. Others referred to the fact that the problems in parking and traffic congestion near many of the stadiums were great enough to prevent them from making the trip into a larger city.

TABLE 57
LOCUS OF SPORTING EVENTS, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Sporting Events Attended in Springfield	Sporting Events Attended in Columbus	Sporting Events Attended in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	7	0	7	11	25
C side of BP	<u>3</u>	<u>1</u>	<u>5</u>	<u>16</u>	<u>25</u>
Total	10	1	12	27	50
<u>Sample BB^b</u>					
S side of M	0	2	10	13	25
C side of M	<u>0</u>	<u>4</u>	<u>8</u>	<u>13</u>	<u>25</u>
Total	0	6	18	26	50
<u>Combination Sample No. 2</u>					
	10	7	30	53	100

^aFor map, see Appendix III, Figure 40.

^bFor map, see Appendix IV, Figure 53.

TABLE 58

LOCUS OF SPORTING EVENTS, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Sporting Events Attended in Springfield	Sporting Events Attended in Columbus	Sporting Events Attended in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	14	0	14	22	50
C side of BP	<u>6</u>	<u>2</u>	<u>10</u>	<u>32</u>	<u>50</u>
Total	20	2	24	54	100
<u>Sample BB^b</u>					
S side of M	0	4	20	26	50
C side of M	<u>0</u>	<u>8</u>	<u>16</u>	<u>26</u>	<u>50</u>
Total	0	12	36	52	100
<u>Combination Sample No. 2</u>					
	10	7	30	53	100

^aFor map, see Appendix III, Figure 40.^bFor map, see Appendix IV, Figure 53.

Locus of music events

The great majority of those people who were sampled did not go to the city for the majority of their musical entertainment.

Of this group, most of them indicated that they never went to any place of business to be entertained by music. Concerning those

who did go to musical events, most of them were high school and church functions, along with public band concerts.

TABLE 59
LOCUS OF MUSIC EVENTS, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Music Events Attended in Springfield	Music Events Attended in Columbus	Music Events Attended in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	8	2	1	14	25
C side of BP	<u>2</u>	<u>2</u>	<u>4</u>	<u>17</u>	<u>25</u>
Total	10	4	5	31	50
<u>Sample BB^b</u>					
S side of M	0	7	3	15	25
C side of M	<u>0</u>	<u>2</u>	<u>3</u>	<u>20</u>	<u>25</u>
Total	0	9	6	35	50
<u>Combination Sample No. 2</u>					
	10	13	11	66	100

^aFor map, see Appendix III, Figure 41.

^bFor map, see Appendix IV, Figure 54.

TABLE 60
LOCUS OF MUSIC EVENTS, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Music Events Attended in Springfield	Music Events Attended in Columbus	Music Events Attended in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	16	4	2	28	50
C side of BP	<u>4</u>	<u>4</u>	<u>8</u>	<u>34</u>	<u>50</u>
Total	20	8	10	62	100
<u>Sample BB^b</u>					
S side of M	0	14	6	30	50
C side of M	<u>0</u>	<u>4</u>	<u>6</u>	<u>40</u>	<u>50</u>
	0	18	12	70	100
<u>Combination Sample No. 2</u>					
	10	13	11	66	100

^aFor map, see Appendix III, Figure 41.

^bFor map, see Appendix IV, Figure 54.

Locus of restaurants

More than one-half (29 per cent in Columbus and 24 per cent in Springfield, as shown in Combination Sample No. 2) of the respondents stated that they usually went either to Springfield or Columbus when they dined away from home. Although Springfield was by far the strongest in Sample AA, Columbus was even

stronger in Sample BB. This may be partially due to the fact that Columbus has a wider variety of restaurant establishments and the corresponding greater variety of foods and atmospheres.

TABLE 61
LOCUS OF RESTAURANTS, ABSOLUTE VALUES

Legend: BP = Breaking Point M = Midpoint

	Restaurants Patronized in Springfield	Restaurants Patronized in Columbus	Restaurants Patronized in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	17	3	1	4	25
C side of BP	<u>6</u>	<u>6</u>	<u>6</u>	<u>7</u>	<u>25</u>
Total	23	9	7	11	50
<u>Sample BB^b</u>					
S side of M	1	12	7	5	25
C side of M	<u>0</u>	<u>8</u>	<u>12</u>	<u>5</u>	<u>25</u>
Total	1	20	19	10	50
<u>Combination Sample No. 2</u>					
	24	29	26	21	100

^aFor map, see Appendix III, Figure 42.

^bFor map, see Appendix IV, Figure 55.

TABLE 62

LOCUS OF RESTAURANTS, PERCENTAGES

Legend: BP = Breaking Point M = Midpoint

	Restaurants Patronized in Springfield	Restaurants Patronized in Columbus	Restaurants Patronized in Other Towns	No Response	Total Number in Sample
<u>Sample AA^a</u>					
S side of BP	34	6	2	8	50
C side of BP	<u>12</u>	<u>12</u>	<u>12</u>	<u>14</u>	<u>50</u>
Total	46	18	14	22	100
<u>Sample BB^b</u>					
S side of M	2	24	14	10	50
C side of M	<u>0</u>	<u>16</u>	<u>24</u>	<u>10</u>	<u>50</u>
Total	2	40	38	20	100
<u>Combination Sample No. 2</u>					
	24	29	26	21	100

^aFor map, see Appendix III, Figure 42.^bFor map, see Appendix IV, Figure 55.A statistical analysis of
the 1967 study

General discussion

The following statistical analysis will provide a valuable insight into the results and their significance. This particular section will deal with the testing of Reilly's Law (Test III) to see

if it was an effective approach to use in the determination of trading areas. An alternative approach of using a geographic midpoint (Test IV) is also discussed.

Test III

Did the breaking point, as determined by the formula derived from Reilly's Law, provide an effective approach to be used in the determination of trading areas?

Reilly's Law was tested by forming a sample (Sample AA) around a breaking point determined by a formula derived from the law. If the law worked, the number of people in the sample area that purchased goods and services in Springfield would equal the number that bought in Columbus. The following procedure was used to determine whether or not that equality existed:

- i. Null hypothesis. -- H_0 : In the sample formulated around the breaking point (Sample AA), there is no difference in the two groups (Springfield buyers and Columbus buyers) in that the proportion of Springfield buyers who buy Group I¹⁰⁰ items is the same as the proportion of Columbus buyers who buy Group I

¹⁰⁰See General discussion of Group I, pages 52-53.

items, and that this holds true for Group II¹⁰¹ and Group III¹⁰² items, also.

ii. Statistical test. --The chi square test for two independent groups is chosen because the two groups (Springfield and Columbus buyers) are independent and because the figures under study are frequencies in discrete categories (Group I, Group II, and Group III items).¹⁰³

iii. Significance level. --Let $\alpha = .05$.

iv. Rejection region. --The region of rejection of the null hypothesis consists of all values of chi square (χ^2) that are so large that the probability associated with their occurrence is equal to or less than $\alpha = .05$ (i. e., that the critical value of chi square is equal to or greater than 5.99 for $df = 2$).

v. Decision. --The pertinent findings are presented in Table 63 below. This points out that of those who bought Group I items in Sample AA, 140 bought them in Springfield and 25 in Columbus. Group II items were purchased 95 times in Springfield

¹⁰¹See General discussion of Group II, page 70.

¹⁰²See General discussion of Group III, page 78.

¹⁰³The Group I, Group II, and Group III figures were determined by summing their individual component categories, as shown on page 15.

and 9 times in Columbus. Group III items were bought 57 times in Springfield and 17 times in Columbus. The "expected" values were computed and shown in the upper left hand corner of the appropriate cells. This was done by multiplying the two marginal totals common to a particular cell and then dividing this product by the total number of observations (i. e., N) to obtain the expected frequency.

TABLE 63
PLACE AND TYPE OF PURCHASE: OBSERVED AND
EXPECTED FREQUENCIES (SAMPLE AA)

Group	Springfield Buyers		Columbus Buyers	
I	140.5	140	24.5	15 = 165
II	88.5	95	15.5	9 = 104
III	63.0	57	11.0	17 = 74
Total		292		51 = 343

With this data, the expected values were compared with the actual values in order to determine the specific value of chi

square (x^2). The computation of x^2 for the data in Table 63 is straightforward:

$$x^2 = \sum_{i=1}^r \sum_{j=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

$$x^2 = \frac{(140 - 140.5)^2}{140.5} + \frac{(25 - 24.5)^2}{24.5} + \frac{(95 - 88.5)^2}{88.5} + \frac{(15.5 - 9)^2}{9}$$

$$+ \frac{(57 - 63.0)^2}{63.0} + \frac{(17 - 11.0)^2}{11.0}$$

$$x^2 = .00 + .01 + .48 + 2.73 + .57 + 3.28$$

$$x^2 = 7.07$$

In a table of critical values of chi square, the chi square (x^2) of 7.05^{104} with two degrees of freedom was shown to have a probability associated with its occurrence of approximately $\alpha = .03$. Therefore, the null hypothesis is rejected in this case. From observation, it is possible to see that the pulling power of Springfield is much greater than that of Columbus in Sample AA.

¹⁰⁴The Kolmogorov-Smirnov test was run on the identical data and yielded a maximum difference (D) which, when converted by its formula to a chi square figure, had a $x^2 = 6.402$ with $df = 2$. Even though this is slightly below the $x^2 = 7.07$ above, it still had a probability associated with its occurrence of only $\alpha = .04$. Therefore, this figure supports the one determined by the chi square analysis.

TABLE 64

DETERMINATION OF TOTAL GROUP I, II, AND III
RESPONSES FOR SAMPLE AA (1967)

Group	Springfield Buyers	Columbus Buyers
Group I		
Barber	19	0
Doctor	16	0
Christmas Shopping	32	9
Groceries	6	0
Dress Clothes	30	8
Work and School Clothes	<u>37</u>	<u>8</u>
Total	140	25
Group II		
Television Sets	25	4
Washers	21	3
Automobiles	<u>49</u>	<u>2</u>
Total	95	9
Group III		
Motion Pictures	24	3
Sporting Events	5	1
Music Events	5	4
Restaurants	<u>23</u>	<u>9</u>
Total	57	17

Test IV

Did the geographic midpoint provide an effective approach to be used in the determination of a trading area boundary?

Another method of determining trading areas was tested by forming a sample around the geographic midpoint. If this approach worked, the number of people that bought in Springfield would be equal to the number that bought in Columbus. The following procedure was used to determine whether or not that equality existed:

- i. Null hypothesis. -- H_0 : In the sample formulated around the midpoint (Sample BB), there is no difference in the two groups (Springfield buyers and Columbus buyers) in that the proportion of Springfield buyers who buy Group I¹⁰⁵ items is the same as the proportion of Columbus buyers who buy Group I items, and that this holds true for Group II¹⁰⁶ and Group III¹⁰⁷ items, also.
- ii. Statistical test. --The chi square test for two independent groups is chosen because the two groups (Springfield and Columbus buyers) are independent, and because the figures

¹⁰⁵See General discussion of Group I, pages 52-53.

¹⁰⁶See General discussion of Group II, page 70.

¹⁰⁷See General discussion of Group III, page 78.

under the study are frequencies in discrete categories (Group I, Group II, and Group III items).

iii. Significance level. --Let $\alpha = .05$.

iv. Rejection region. --The region of rejection of the null hypothesis consists of all values of chi square (χ^2) that are so large that the probability associated with their occurrence is equal to or less than $\alpha = .05$ (i. e., that the critical value of chi square is equal to or greater than 5.99 for $df = 2$).

v. Decision. --The pertinent findings are presented in Table 65 below.¹⁰⁸ This points out that of those who bought Group I items in Sample BB, 8 bought them in Springfield and 109 in Columbus. Group II items were purchased 5 times in Springfield and 32 times in Columbus. Group III items were bought 2 times in Springfield and 57 times in Columbus. The "expected" values were computed and shown in the upper left hand corner of the appropriate cells. This was done by multiplying the two marginal totals common to a particular cell and then dividing this product by the total number of observations (i. e., N) to obtain the expected frequency.

¹⁰⁸The Group I, Group II, and Group III figures were determined by summing their individual component categories, as shown on page 20.

TABLE 65
PLACE AND TYPE OF PURCHASE: OBSERVED AND
EXPECTED FREQUENCIES (SAMPLE BB)

Group	Springfield Buyers		Columbus Buyers		
I	8.2	8	108.8	109	= 117
II	2.6	5	34.4	32	= 37
III	4.2	2	54.8	57	= 59
Total		15		198	= 213

With this data, the expected values were compared with the actual values in order to determine the specific value of chi square (x^2). The computation of chi square (i. e., x^2) for the data in Table 65 is straightforward:

$$x^2 = \sum_{i=1}^r \sum_{j=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

$$x^2 = \frac{(8 - 8.2)^2}{8.2} + \frac{(109 - 108.8)^2}{108.8} + \frac{(5 - 2.6)^2}{2.6} + \frac{(32 - 34.4)^2}{34.4} \\ + \frac{(2 - 4.2)^2}{4.2} + \frac{(57 - 54.8)^2}{54.8}$$

$$x^2 = .00 + .00 + 2.22 + .17 + 1.16 + .09$$

$$x^2 = 3.64$$

In a table of critical values of chi square, the chi square of 3.64¹⁰⁹ with two degrees of freedom was shown to have a probability associated with its occurrence somewhere between $\alpha = .20$ and $\alpha = .15$. This would generally be thought of as grounds for not rejecting the null hypothesis. However, as several authors have pointed out, when the expected values in each cell are smaller than minimal, the test may not be considered as proper or meaningful for use.¹¹⁰ Due to the fact that all three cells on the Springfield side of the table are eight or less, and two of these are five or less, and the rule of thumb for all chi square testing requires that all cells have a value of five at the extreme minimum and because figures near five are very questionable, it is the opinion of the author that this test is not effective in this case. By observation one can see that the great differences favoring Columbus here are similar to those favoring Springfield in the analysis of Sample B.

¹⁰⁹The Kolmogorov-Smirnov test was run on the identical data and yielded a maximum difference (D) which, when converted by its formula to a chi square figure, had a $x^2 = 4.36$. Although this differs slightly from the $x^2 = 3.64$ above, it had a probability associated with its occurrence of slightly less than $\alpha = .15$. This supports the chi square analysis.

¹¹⁰See Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., Inc., 1956), p. 110.

TABLE 66

DETERMINATION OF TOTAL GROUP I, II, AND III
RESPONSES FOR SAMPLE BB (1967)

Group	Springfield Buyers	Columbus Buyers
Group I		
Barber	1	4
Doctor	0	5
Christmas Shopping	3	33
Groceries	1	4
Dress Clothes	1	33
Work and School Clothes	<u>2</u>	<u>30</u>
Total	8	109
Group II		
Television Sets	0	11
Washers	1	8
Automobiles	<u>4</u>	<u>13</u>
Total	5	32
Group III		
Motion Pictures	1	22
Sporting Events	0	6
Music Events	0	9
Restaurants	<u>1</u>	<u>20</u>
Total	2	57

Findings for specific advertising media

Locus of newspapers

Approximately 77 per cent (40 of 52) of all subscriptions of respondents in Sample AA were to the Springfield Sun. Of the forty, approximately three-fifths were located to the west side of the breaking point, or toward Springfield. The Columbus Dispatch accounted for approximately 15 per cent (8 of 52), while the Columbus Citizen-Journal was sold to about 8 per cent of the respondents. From the 1964 results the Springfield Sun increased its share of the market about 7 per cent, the Columbus Citizen-Journal rose some 3 per cent, while the Columbus Dispatch decreased about 10 per cent in 1967.

In Sample BB, only a slight decline in Columbus Dispatch subscriptions, offset by a meager increase in the Springfield Sun circulation can be detected. The total number of subscriptions rose only one per cent to the total number of respondents.

TABLE 67

LOCUS OF NEWSPAPER SUBSCRIPTIONS IN SAMPLE AA^a

	Number of Subscribers to <u>Springfield Sun</u>	Number of Subscribers to <u>Cols. Dispatch</u>	Number of Subscribers to <u>Cols. Cit. -Jour.</u>
Springfield Side of Breaking Point	23	1	1
Columbus Side of Breaking Point	<u>17</u>	<u>7</u>	<u>3</u>
Total Number of Subscribers	40	8	4

^aFor map, see Appendix III, Figure 43.

TABLE 68

LOCUS OF NEWSPAPER SUBSCRIPTIONS IN SAMPLE BB^a

	Number of Subscribers to <u>Springfield Sun</u>	Number of Subscribers to <u>Cols. Dispatch</u>	Number of Subscribers to <u>Cols. Cit. -Jour.</u>
Springfield Side of Midpoint	5	16	4
Columbus Side of Midpoint	<u>1</u>	<u>13</u>	<u>3</u>
Total Number of Subscribers	6	29	7

^aFor map, see Appendix IV, Figure 56.

Locus of radio listening

Concerning the six largest radio stations, measured by the size of audience, WLW in Cincinnati and WIZE and WBLY in Springfield accounted for more than 75 per cent (32 of 42 responses) of the listeners in Sample AA. The three Columbus area stations (i. e., WTVN, WRFD, and WCOL) accounted for the less than one-fourth of the listeners remaining. The results here differ greatly from those obtained in the 1964 study, in which WLW accounted for over 35 per cent and WCOL in Columbus had almost 20 per cent of the responses. The Springfield stations (i. e., WIZE and WBLY) rose from less than 30 per cent to exactly one-half, or 50 per cent, of the listener responses in 1967. It was felt that people located in Sample A, which is located so much closer to Springfield than Columbus, didn't listen to Springfield stations in 1964 due to the facts that Cincinnati's WLW and Columbus' WCOL were more powerful in wattage, had more popular "disc jockeys" and commentators, and had greater financial backing which allowed for better programs, personnel, and general sound and tone. However, the change or switch from more distance to the more local stations can partially be explained by the increase in power in both of the Springfield stations. Also, both WIZE and WBLY have gained in popularity

due to a change in personnel and disc jockeys. Better programming can also be found in those stations.

In Sample BB, none of the forty-two respondents listed either Springfield station as a favorite one. In other words, the two Springfield stations dropped from having 21 of 42 listeners in Sample AA to 0 of 42 in Sample BB. The major reason for this is due to the fact that these stations aren't powerful enough to reach the Sample BB area with clear reception. Other variations in radio listening popularity existed between Samples AA and BB. Of the six top stations in total listening audience, Columbus stations were dominant, with WTVN accounting for nearly 30 per cent, WCOL and WMNI about 20 per cent each, WRFD about 15 per cent, and WLW and WONE about 5 per cent each. In other words, Columbus area stations accounted for approximately 90 per cent of the listeners or were definitely dominant in listening popularity.

WCOL in Columbus was the most often listened to radio station by far in 1964, having eight listeners in Sample A and nineteen in Sample B. These figures were reduced appreciably to two listeners in Sample AA and nine in Sample BB. From 1964 to 1967, WCOL's total number of responses thereby can be seen to have been decreased from twenty-seven to eleven, or to less than half. Several possible reasons exist. Initially, the Springfield stations (i. e., WBLY and WIZE) have made significant strides in popularity due to

a shift in personnel. Also, both WIZE and WBLY compete directly with WCOL in that they play the same type of music and present a programming format quite similar to it, emphasizing "rock-and-roll" music, with brief pauses periodically for news, weather, and sports.

TABLE 69
LOCUS OF RADIO LISTENING IN SAMPLE AA^a

	Number of Listeners					
	WLW	WCOL	WIZE	WBLY	WTVN	WRFD
Springfield Side of Breaking Point	3	0	7	9	0	2
Columbus Side of Breaking Point	8	2	4	1	4	2
Total Listening Audience	11	2	11	10	4	4

^aFor map, see Appendix III, Figure 44.

TABLE 70
LOCUS OF RADIO LISTENING IN SAMPLE BB^a

	Number of Listeners					
	WLW	WTVN	WCOL	WRFD	WMNI	WONE
Springfield Side of Midpoint	1	10	4	0	2	2
Columbus Side of Midpoint	2	2	5	7	7	0
Total Number of Listeners	3	12	9	7	9	2

^aFor map, see Appendix IV, Figure 57.

Locus of television viewing

All three Columbus television stations (i. e., Channels 4, 6, and 10) were more popular than the one in Dayton (i. e., Channel 7) in Sample AA. There were twenty-nine responses from Channel 10, fifteen for Channel 6, twelve for Channel 4, and only seven for Channel 7. In other words, Columbus had three of the four television stations viewed by the respondents, and accounted for approximately 90 per cent (56 of 63) of the sample area lying eight to eighteen miles east of Springfield and twenty-six to thirty-six miles west of Columbus. These results differ significantly in certain respects from those obtained in the 1964 study. Although the three Columbus

stations accounted for 85 to 90 per cent of the total respondents in both studies, the distribution between the channels has changed greatly. Of the four stations, Channel 10 increased from 32 to 46 per cent, Channel 6 increased from 21 to 24 per cent, Channel 4 declined from 31 to 19 per cent, while Channel 7 declined from 16 to 11 per cent. One of the primary reasons for Channel 10 increasing from gaining nearly one-third to almost one-half of the respondents' viewing is that it is the only one to carry a full movie at 10:00 a.m., at 4:30 p.m., and also at 11:30 p.m. during the week. Also, reception for Channel 10 was considered as good or better than that received for the other stations by respondents commenting on the amount of interference experienced.

There was a similar situation occurring from the results in Sample BB. Channel 10 increased from 35 to 43 per cent of the total responses, Channel 6 decreased from 39 to 28 per cent, Channel 4 stayed at approximately 26 per cent, while Channel 7 rose from 0 to 3 per cent. Channel 10 rose in popularity in this area due to their greater offering of movies and good reception, as pointed out above. All Columbus stations were stronger in Sample BB than they were in Sample AA in an absolute sense, while the Dayton channel was stronger in Sample AA, or the one located nearer to it, than it was in Sample BB. This may partially

disprove the hypothesis stated in the 1964 study that the topographical reason of interferences in sound waves being caused by differences in land elevations had caused Channel 4 to receive a greater number of responses in Sample A than Sample B even though the former was located farther from Columbus.

TABLE 71
LOCUS OF TELEVISION VIEWING IN SAMPLE AA^a

	Columbus Channel 4	Columbus Channel 6	Dayton Channel 7	Columbus Channel 10
Springfield Side of Breaking Point	4	8	5	15
Columbus Side of Breaking Point	8	7	2	14
Total Audience	12	15	7	29

^aFor map, see Appendix III, Figure 45.

TABLE 72
LOCUS OF TELEVISION VIEWING IN SAMPLE BB^a

	Columbus Channel 4	Columbus Channel 6	Dayton Channel 7	Columbus Channel 10
Springfield Side of Midpoint	10	8	1	16
Columbus Side of Midpoint	9	12	1	15
Total Audience	19	20	2	31

^aFor map, see Appendix IV, Figure 58.

Relationships between adver-
tising media and the purchasing
of goods and services

Newspapers

In relating the shopping habits of the respondents to newspapers there were certain meaningful relationships that resulted. The following table (i. e., Table 73) shows the circulations of the Columbus and Springfield newspapers in both Sample AA and Sample BB.

TABLE 73

LOCUS OF NEWSPAPER SUBSCRIPTIONS
(Percentage of Subscribers to Total
Number of Respondents for
Specific Samples)

<u>Springfield Sun</u> Subscribers (as Percentage of Sample AA Respondents	<u>Springfield Sun</u> Subscribers (as Percentage of Sample BB Respondents	<u>Cols. Dispatch</u> <u>and Cit. Journ.</u> Subscribers (as Percentage of Sample AA Respondents	<u>Cols. Dispatch</u> <u>and Cit. - Journ.</u> Subscribers (as Percentage of Sample BB Respondents
80%	12%	24%	72%

The figures expressed in Table 74 relate directly to those in Table 73. Springfield sellers attract Sample AA buyers with more regularity and volume, while Columbus is more popular in Sample BB. Accordingly, Springfield and Columbus newspapers also have larger circulations in the sample located nearest to each of them. It is interesting to note that although Columbus sellers and newspapers dominate Sample BB, the proportion of purchasers patronizing Columbus merchants is only about one-half that of those respondents in Sample AA purchasing in Springfield. This is partially due to the distance factor. The "average" Sample BB respondent is still twenty-two miles (i. e., at the geographic midpoint) from Columbus after he reaches Highway 40, while the

"average" Sample AA respondent is only thirteen miles (i. e., at the breaking point) from Springfield after he reaches Highway 40.

There should also be consideration given to the fact that the number of respondents traveling to Columbus or Springfield for various consumer goods is proportionately more as one moves from convenience to shopping to specialty goods (see Table 74). This supports the definitions of these three classes of consumer goods, which state that the least effort will be exerted and the shortest distance will be traveled for convenience goods, with more effort exerted and more distance traveled for shopping goods and specialty goods, respectively. Also, customers will travel further distances for goods and services as the number of such items that are available at different trading centers is increased.¹¹¹

Radio

The two Springfield stations (i. e., WBLY and WIZE) rose from being listened to by less than one-fourth to one-half of the Sample A and AA respondents, respectively. These two stations had almost no listening audience in Sample BB. In the 1964 study only two Columbus stations (i. e., WCOL and WTVN) had a

¹¹¹Huff, loc. cit., pp. 85-86.

TABLE 74

LOCUS OF SHOPPING HABITS FOR PARTICULAR GOODS AND SERVICES
(Percentage of Purchasers to Total Number of Respondents for
Specific Samples)

	Percentage of Respondents in Sample AA Pur- chasing in Springfield	Percentage of Respondents in Sample AA Pur- chasing in Columbus	Percentage of Respondents in Sample BB Pur- chasing in Springfield	Percentage of Respondents in Sample BB Pur- chasing in Columbus
<u>Convenience Goods</u>				
Groceries	12	0	2	8
<u>Shopping Goods</u>				
(non-durable)				
Work and School Clothes	74	16	4	60
(durable)				
Television Sets	50	8	0	22
Washers	42	6	2	16
<u>Specialty Goods</u>				
(non-durable)				
Dress Clothes	60	16	2	66
(durable)				
Automobiles	49	2	4	13
<u>Services</u>				
Motion Pictures	48	6	2	44
Restaurants	46	18	2	40
<u>Overall Measure</u>				
Christmas Shopping	64	18	6	68

listening audience of any size. In 1967, WRFD and WMNI had grown to a significant size while WCOL, although still important, had declined in popularity. In Sample AA, Springfield stations accounted for 50 per cent of the respondents, WLW was listened to by approximately 25 per cent, while the Columbus stations made up the remaining 25 per cent. In Sample BB, Columbus stations were listened to most by about 90 per cent, with Dayton and Cincinnati stations receiving nearly 10 per cent of the responses.

The great majority of the local radio stations had very small listening audiences. This can partially be attributed to the fact that many of them are aimed at special interest groups or specific classes of people. It seems fairly apparent that there has been a change from WCOL to WMNI and WRFD, as well as WTVN, in Columbus, while WIZE and WBLY have made significant inroads into the total radio audience in the surveyed area. Therefore, sellers advertising through this medium should possibly consider their alternative stations more carefully.

Television

The Dayton television station (i. e. , Channel 7) received by some respondents is actually viewed less than any one of the three Columbus stations in Sample AA and had no audience at all in the Sample BB area. It would be a very poor medium for Springfield

sellers in advertising to the surveyed areas. The Columbus stations, on the other hand, have undergone a significant change in their individual audiences. Channel 10 had the largest audience by a significant margin due to a great increase in responses in the 1967 study. Channel 6 stayed approximately the same, while Channel 4 declined greatly. Of the 100 respondents, 60 (i. e., 29 in Sample AA and 31 in Sample BB) mentioned Channel 10 as one of their favorites, 35 (i. e., 15 in Sample AA and 20 in Sample BB) listed Channel 6, while 31 (i. e., 12 in Sample AA and 19 in Sample BB) named Channel 4. In other words, of the 126 total responses, about 45 per cent were located in Sample AA, which shows that this is a case in which the audience diminishes only slightly with distance.

Due to the fact that there is no television station in Springfield, and the relatively good popularity of the Columbus stations, it would be impossible to compare this medium between the two cities. However, it is evident that the shift from 1964 to 1967 favoring Channel 10 by a margin is great enough to make most sellers favor it slightly in both Sample AA and Sample BB in comparison with the other two Columbus stations (i. e., Channel 6 and Channel 4).

CHAPTER VI

STATISTICAL ANALYSIS OF 1964 AND 1967 STUDIES

General discussion

Each of the samples selected in 1964 (i. e. , Samples A and B) must be tested against themselves in 1967 (i. e. , Samples AA and BB), respectively. This must be done to determine whether or not the studies, done forty months apart, had consistency. This will be done by the Kolmogorov-Smirnov test, which is felt to be the strongest nonparametric statistical test available. Initially, Samples A and AA will be compared. This will be followed by a comparison of Samples B and BB.

Tests for Samples A and AA

Two separate tests will be sufficient to determine whether or not there is a difference between Sample A and Sample AA. First, Springfield responses in Sample A will be compared to Springfield responses in Sample AA. Second, Columbus responses in Sample A will be compared to Columbus responses in Sample AA.

First test for Samples A and AA:
Springfield responses

i. Null hypothesis. -- H_0 : There is no difference in the proportion of the purchasing done by Springfield buyers in Sample A (1964) and Sample AA (1967).

ii. Statistical test. -- Since two independent samples are being compared, the Kolmogorov-Smirnov two-sample test can be applied to the data. This is accomplished by making a cumulative frequency distribution for each sample of observations, using the same intervals for both distributions. For each interval (i. e., a particular good or service, in this case), then, we must subtract one step function from another. The test focuses on the largest of these deviations (D). This D can be determined by the following formula: $D = \text{maximum } S_{n1}(X) - S_{n2}(X)$, where $S_{n1}(X)$ is the observed cumulative step function of the samples and $S_{n2}(X)$ is the observed cumulative step function of the other.

iii. Significance level. -- $\alpha = .05$.

iv. Region of rejection. -- H_0 (the null hypothesis) will be rejected if the values of χ^2 are so large that the probability associated with their occurrence under H_0 for $df = 2$ is equal to or less than $\alpha = .05$ (i. e., that the critical value of chi square is equal to or greater than 5.99) as computed by the following formula

which translates the D (difference) found into the chi square value:

$$x^2 = 4D^2 \frac{n_1 n_2}{n_1 + n_2} \cdot^{112}$$

In other words, the significance of D (difference) can be determined by the formula translating the figure to a chi square value.

v. Decision. -- Table 75 gives the number of respondents purchasing the various goods and services in Sample A (1964) and Sample AA (1967) in Springfield.

For analysis by the Kolmogorov-Smirnov test, these data were cast into two cumulative frequency distributions, shown in Table 76. Here $n_1 = 237$ Springfield responses in Sample A and $n_2 = 268$ Springfield responses in Sample AA.

From Table 76, it can be seen that the largest difference (D) between the two samples is .053. Substituting this and the other appropriate figures into the formula designed to transfer D into a chi square value, we have the following:

$$x^2 = 4D^2 \frac{n_1 n_2}{n_1 + n_2}$$

$$x^2 = 4(.053)^2 \frac{(237 \cdot 268)}{237 + 268}$$

$$x^2 = .011 (125.8)$$

$$x^2 = 1.3838$$

¹¹²See L. A. Goodman, "Kolmogorov-Smirnov Tests for Psychological Research," Psychol. Bull. LI (1954), 160-68.

TABLE 75
FREQUENCY DISTRIBUTION OF SPRINGFIELD
RESPONSES (SAMPLES A AND AA)

Good or Service Category	Springfield Buyers in Sample A (1964)	Springfield Buyers in Sample AA (1967)
Barbers	16	19
Doctors	15	16
Christmas Shopping	32	32
Television Sets	24	25
Washers	23	21
Automobiles	18 ^a	25 ^a
Groceries	8	6
Dress Clothes	30	30
Work and School Clothes	33	37
Motion Pictures	17	24
Sporting Events	1	5
Restaurants	<u>17</u>	<u>23</u>
Total	237	268

^aThese figures constitute one-half of the responses due to the fact that respondents were asked to state where they purchased their last two automobiles.

TABLE 76
CUMULATIVE FREQUENCY DISTRIBUTIONS FOR
SPRINGFIELD RESPONSES
(Plus Corresponding Decimal Equivalent)

Good or Service Category	$S_{n_1}(X)$, or $S_{237}(X)$ (Sample A)	$S_{n_2}(X)$, or $S_{268}(X)$ (Sample AA)	$S_{237}(X) - S_{268}(X)$, or D
Barbers	16/237= .068	19/268= .071	-.003
Doctors	31/237= .131	35/268= .131	.000
Christmas Shopping	63/237= .225	67/268= .250	-.025
Television Sets	87/237= .367	92/268= .343	+.024
Washers	110/237= .464	113/268= .422	+.042
Automobiles	128/237= .540	138/268= .515	+.025
Groceries	136/237= .574	144/268= .537	+.037
Dress Clothes	166/237= .700	174/268= .649	+.051
Work and School Clothes	199/237= .840	211/268= .787	+.053
Motion Pictures	216/237= .911	235/268= .877	+.034
Sporting Events	219/237= .924	240/268= .896	+.028
Music Events	220/237= .929	245/268= .915	+.014
Restaurants	237/237=1.000	268/268=1.000	.000

By checking the appropriate table of critical values of chi square, the χ^2 of 1.3838 (for $df = 2$)¹¹³ is found to be so small that the probability associated with its occurrence is near $\alpha = .50$.

Therefore, the null hypothesis is accepted.

¹¹³Required number of degrees of freedom if this particular χ^2 formula is used.

Second test for Samples A and AA:
Columbus responses

i. Null hypothesis. -- H_0 : There is no difference in the proportion of purchasing done by Columbus buyers in Sample A (1964) and Sample AA (1967).

ii. Statistical test. --Since two independent samples are being compared, the Kolmogorov-Smirnov two-sample test can be applied to the data.

iii. Significance level. --Let $\alpha = .05$.

iv. Region of rejection. -- H_0 (the null hypothesis) will be rejected if x^2 (determined by the formula) for $df = 2$ is so large that the probability associated with their occurrence is equal to, or less than $\alpha = .05$ (i. e., that the critical value of chi square is equal to or greater than 5.99).

v. Decision. --Table 77 gives the number of respondents purchasing the various goods and services in Sample A (1964) and Sample AA (1967) in Columbus.

TABLE 77
FREQUENCY DISTRIBUTION OF COLUMBUS
RESPONSES (SAMPLES A AND AA)

Good or Service Category	Columbus Buyers in Sample A (1964)	Columbus Buyers in Sample AA (1967)
Barber	0	0
Doctor	1	0
Christmas Shopping	4	9
Television Sets	2	4
Washers	2	3
Automobiles	4	2
Groceries	0	0
Dress Clothes	5	8
Work and School Clothes	5	8
Motion Pictures	4	3
Sporting Events	2	1
Music Events	3	4
Restaurants	<u>7</u>	<u>9</u>
Total	39	51

For analysis by the Kolmogorov-Smirnov test, these data were cast into two cumulative frequency distributions, shown in Table 78. Here $n_1 = 39$ Columbus responses in Sample A and $n_2 = 51$ Columbus responses in Sample AA.

TABLE 78
CUMULATIVE FREQUENCY DISTRIBUTIONS FOR
COLUMBUS RESPONSES
(Plus Corresponding Decimal Equivalent)

Good or Service Category	$S_{n_1}(X)$, or $S_{39}(X)$ (Sample A)	$S_{n_2}(X)$, or $S_{51}(X)$ (Sample AA)	$S_{39}(X)-S_{51}(X)$ or D
Barbers	0/39= .00	0/51= .00	.00
Doctors	1/39= .03	0/51= .00	+.03
Christmas Shopping	5/39= .13	9/51= .18	-.05
Television Sets	7/39= .18	13/51= .26	-.08
Washers	9/39= .23	16/51= .32	-.09
Automobiles	13/39= .33	18/51= .35	-.02
Groceries	13/39= .33	18/51= .35	-.02
Dress Clothes	18/39= .46	26/51= .51	-.05
Work and School Clothes	23/39= .59	34/51= .67	-.08
Motion Pictures	27/39= .69	37/51= .73	-.04
Sporting Events	29/39= .74	38/51= .75	-.01
Music Events	32/39= .82	42/51= .82	.00
Restaurants	39/39=1.00	51/51=1.00	.00

From this table it can be seen that the largest difference (D) between the two samples is .09. Substituting this and the other appropriate information (figures) into the formula, we have the following:

$$x^2 = 4D^2 \frac{n_1 n_2}{n_1 + n_2}$$

$$x^2 = 4(.09)^2 \frac{39 \cdot 51}{39 + 51}$$

$$x^2 = .032 (22.1)$$

$$x^2 = .7072$$

The null hypothesis is accepted in this case because the probability associated with $\chi^2 = .7072$ for $df = 2$ is approximately $\alpha = .70$.

Tests for Samples B and BB

Two separate tests will be conducted to determine whether or not there is a difference between Sample B and Sample BB. First, Springfield responses in Sample B will be compared to Springfield responses in Sample BB. Second, Columbus responses in Sample B will be compared to Columbus responses in Sample BB.

First test for Samples B and BB:
Springfield responses

i. Null hypothesis. -- H_0 : There is no difference in the proportion of the purchasing done by Springfield buyers in Sample B (1964) and Sample BB (1967).

ii. Statistical test. --Since two independent samples are being compared, the Kolmogorov-Smirnov two-sample test can be applied to the data. This is accomplished by making a cumulative frequency distribution for each sample of observations, using the same intervals for both distributions. For each interval (i. e., a particular good or service, in this case), then, we must subtract one step function from another. The test focuses on the largest of

these deviations (D). This D can be determined by the following formula: $D = \text{maximum } S_{n1}(X) - S_{n2}(X)$, where $S_{n1}(X)$ is the observed cumulative step function of one of the samples and $S_{n2}(X)$ is the observed cumulative step function of the other.

iii. Significance level. -- $\alpha = .05$.

iv. Region of rejection. -- H_0 (the null hypothesis) will be rejected if the values of x^2 are so large that the probability associated with their occurrence under H_0 for $df = 2$ is equal to or less than $\alpha = .05$ (i. e., that the critical value of chi square is equal to or greater than 5.99) as computed by the following formula which translates to D (difference) found into the chi square value:

$$x^2 = 4D^2 \frac{n_1 n_2}{n_1 + n_2} \cdot 114$$

In other words, the significance of D (difference) can be determined by the formula translating the figure to a chi square value.

v. Decision. -- Table 79 gives the number of respondents purchasing the various goods and services in Sample B (1964) and Sample BB (1967) in Springfield.

¹¹⁴See Goodman, op. cit., pp. 160-68.

TABLE 79
FREQUENCY DISTRIBUTION OF SPRINGFIELD
RESPONSES (SAMPLES B AND BB)

Good or Service Category	Springfield Buyers in Sample B (1964)	Springfield Buyers in Sample BB (1967)
Barbers	0	1
Doctors	1	0
Christmas Shopping	3	3
Television Sets	1	0
Washers	1	1
Automobiles	5 ^a	4 ^a
Groceries	0	1
Dress Clothes	2	1
Work and School Clothes	1	2
Motion Pictures	4	1
Sporting Events	0	0
Music Events	1	0
Restaurants	<u>1</u>	<u>1</u>
Total	20	15

^aThese figures constitute one-half of the responses due to the fact that respondents were asked to state where they purchased their last two automobiles.

For analysis by the Kolmogorov-Smirnov test, these data were cast into two cumulative frequency distributions, shown in Table 80. Here $n_1 = 20$ Springfield responses in Sample B and $n_2 = 15$ Springfield responses in Sample BB.

TABLE 80
CUMULATIVE FREQUENCY DISTRIBUTIONS FOR
SPRINGFIELD RESPONSES
(Plus Corresponding Decimal Equivalent)

Good or Service Category	$S_{n_1}(X)$, or $S_{20}(X)$ (Sample B)	$S_{n_2}(X)$, or $S_{15}(X)$ (Sample BB)	$S_{20}(X)-S_{15}(X)$ or D
Barbers	0/20= .00	1/15= .07	-.07
Doctors	1/20= .05	1/15= .07	-.02
Christmas Shopping	4/20= .20	4/15= .27	-.07
Television Sets	5/20= .25	4/15= .27	-.02
Washers	6/20= .30	5/15= .33	-.03
Automobiles	11/20= .55	9/15= .60	-.05
Groceries	11/20= .55	10/15= .67	-.12
Dress Clothes	13/20= .65	11/15= .73	-.08
Work and School Clothes	14/20= .70	13/15= .87	-.17
Motion Pictures	18/20= .90	14/15= .93	-.03
Sporting Events	18/20= .90	14/15= .93	-.03
Music Events	19/20= .95	14/15= .93	+.02
Restaurants	20/20=1.00	15/15=1.00	.00

From this table, it can be seen that the largest difference (D) between the two samples is .17. Substituting this and the other appropriate figures into the formula designed to transfer D into a chi square value, we have the following: $x^2 = 4D^2 \frac{n_1 n_2}{n_1 + n_2}$

$$x^2 = 4(.17)^2 \frac{20 \cdot 15}{20+15}$$

$$x^2 = .11(8.57)$$

$$x^2 = .9427$$

The null hypothesis here is accepted on statistical grounds due to the fact that the table of critical values of chi square shows that the probability associated with $\chi^2 = .9427$ for $df = 2$ is approximately $\alpha = .60$, or obviously much higher than the $\alpha = .05$ required for rejection.

Second test for Samples B and BB:
Columbus responses

i. Null hypothesis. -- H_0 : There is no difference in the proportion of purchasing done by Columbus buyers in Sample B (1964) and Sample BB (1967).

ii. Statistical test. -- Since two independent samples are being compared, the Kolmogorov-Smirnov two-sample test can be applied to the data.

iii. Significance level. -- Let $\alpha = .05$.

iv. Region of rejection. -- H_0 (the null hypothesis) will be rejected if χ^2 (determined by the formula) for $df = 2$ is so large that the probability associated with their occurrence is equal to or less than $\alpha = .05$ (i. e., that the critical value of chi square is equal to or greater than 5.99).

v. Decision. -- Table 81 gives the number of respondents purchasing the various goods and services in Sample B (1964) and Sample BB (1967) in Columbus.

TABLE 81
FREQUENCY DISTRIBUTION OF COLUMBUS
RESPONSES (SAMPLES B AND BB)

Good or Service Category	Columbus Buyers in Sample B (1964)	Columbus Buyers in Sample BB (1967)
Barber	2	4
Doctor	3	5
Christmas Shopping	31	33
Television Sets	12	11
Washers	9	8
Automobiles	14 ^a	13 ^a
Groceries	3	4
Dress Clothes	25	33
Work and School Clothes	21	30
Motion Pictures	17	22
Sporting Events	7	6
Music Events	4	9
Restaurants	<u>21</u>	<u>20</u>
Total	169	198

^aThese figures constitute one-half of the responses due to the fact that respondents were asked to state where they purchased their last two automobiles.

For analysis by the Kolmogorov-Smirnov test, these data were cast into two cumulative frequency distributions, shown in Table 82.

TABLE 82
CUMULATIVE FREQUENCY DISTRIBUTIONS FOR
COLUMBUS RESPONSES
(Plus Corresponding Decimal Equivalent)

Good or Service Category	Sn ₁ (X), or S ₁₆₉ (X) (Sample B)	Sn ₂ (X), or S ₁₉₈ (X) (Sample BB)	Sn ₁ (X)-Sn ₂ (X) or D
Barbers	2/169= .01	4/198= .02	-.01
Doctors	5/169= .03	9/198= .05	-.02
Christmas Shopping	36/169= .21	42/198= .21	.00
Television Sets	48/169= .28	53/198= .27	+.01
Washers	57/169= .34	61/198= .31	+.03
Automobiles	71/169= .42	74/198= .37	+.05
Groceries	74/169= .44	78/198= .39	+.05
Dress Clothes	99/169= .59	111/198= .56	+.03
Work and School Clothes	120/169= .71	141/198= .71	.00
Motion Pictures	137/169= .81	163/198= .82	-.01
Sporting Events	144/169= .85	169/198= .85	.00
Music Events	148/169= .88	178/198= .89	-.01
Restaurants	169/169=1.00	198/198=1.00	.00

From this table it can be seen that the largest difference (D) between the two samples is .05. Substituting this and the other appropriate information (figures) into the formula, we have the following:

$$x^2 = 4D^2 \frac{n_1 n_2}{n_1 + n_2}$$

$$x^2 = 4(.05)^2 \frac{169 \cdot 198}{169 + 198}$$

$$x^2 = .01(91.2)$$

$$x^2 = .912$$

The null hypothesis is accepted because the probability associated with $\chi^2 = .912$ for $df=2$ is between $\alpha = .60$ and $\alpha = .65$.

CHAPTER VII

SUMMARY AND CONCLUSIONS

These studies concerned themselves with the testing of the "law of retail gravitation," which states "Two cities attract retail trade from an intermediate city or town in the vicinity of the breaking point, approximately in direct proportion to the populations of the two cities and in inverse proportion to the square of distances,¹¹⁵ from these two cities to the intermediate town."¹¹⁶ The law resulted from the measurement of sales of leading stores of all the larger cities in Texas, house-to-house interviewing of consumer buying habits, and retail stock checking in different sized cities and towns.¹¹⁷

The studies tested the law of retail gravitation at two separate times forty months apart in the rural area between Columbus and Springfield, Ohio, for fourteen different consumer and service type

¹¹⁵Distance via most direct improved automobile highway.

¹¹⁶Reilly, The Law of Retail Gravitation, p. 9.

¹¹⁷For a description of the entire study, see Reilly, Methods for the Study of Retail Relationships.

goods to determine whether or not it would be possible to accurately determine the trading areas for goods and services for which it had been originally intended (i. e. , shopping goods) as well as convenience and specialty goods and services.

The studies in question had certain unique characteristics, which were:

1. They were conducted at two different times that were forty months apart.
2. They were based on two equal-sized samples (i. e. , fifty respondents), one of which was centered around a geographic midpoint (i. e. , Samples B and BB) and the other around the breaking point as determined by Reilly's Law (i. e. , Samples A and AA).
3. They dealt with the area between Springfield and Columbus, Ohio.
4. They surveyed purchases of fourteen different goods and services (see Appendix IV), some of which have seldom, if ever, been used to test the law of retail gravitation.
5. They studied geographic shopping preferences with respect to the intent of the shopping trip, a test variation not always found in the literature.
6. They surveyed certain communication media in the two cities and their respective trading areas.

Both the 1964 and 1967 studies were checked to see if they were similar to each other or were consistent. This reliability was proven to be exceptionally good by the generally considered powerful Kolmogorov-Smirnov statistical tests. Four such tests were conducted (Springfield responses were compared in Samples A and AA¹¹⁸ as well as B and BB,¹¹⁹ while Columbus responses were similarly compared in Samples A and AA¹²⁰ as well as B and BB.¹²¹

From the results, it can be seen that the breaking point determined by the formula derived from Reilly's Law (i. e. , used for Samples A and AA) is inadequate. Also, the one determined by finding the geographic midpoint (i. e. , used for Samples B and BB) was inadequate in terms of accuracy. There are different reasons as to why the breaking point in Samples A and AA and the breaking point in Samples B and BB were inadequate.

The statistical analyses of Springfield and Columbus respondents in Sample A (1964) and Sample AA (1967) respondents resulted in a rejection of the null hypothesis (i. e. , that there was

¹¹⁸See pages 172-75.

¹¹⁹See pages 179-83.

¹²⁰See pages 176-79.

¹²¹See pages 183-86.

no difference in the two groups (Columbus and Springfield buyers) in that the proportion of Springfield buyers who buy Group I items is the same as the proportion of Columbus buyers who buy Group I items, and that this holds true for Group II and Group III items as well). In both cases the number of Springfield respondents far outweighed that of Columbus, and the difference was found to be significant. It is felt that the breaking point derived from the formula (derivation of Reilly's Law) is inaccurate because of the population variable included within it. Columbus is approximately five and one-half times as large as Springfield, and the latter should not be penalized to as great an extent as the formula would indicate. The reasoning behind this view can be seen in the following exaggerated example:

City X = 500,000

City Y = 5,000

Distance between X and Y = 50 miles

$$\begin{aligned} \text{Breaking point (miles from Y)} &= \frac{50}{1 + \sqrt{\frac{500,000}{5,000}}} = \frac{50}{1 + \sqrt{100}} \\ &= 4.5 \text{ miles} \end{aligned}$$

It can and should be realized that a breaking point located 4.5 miles from the smaller city (45.5 miles from the larger one) is likely to be inaccurate even for shopping goods. In other words, it is assumed that the larger the disparity between sizes of cities

in pairs being measured, the greater the inaccuracy of Reilly's Law. Also, the greater the distance, the poorer the effectiveness of the Law. For this analysis, as well as others with either large population differences between the cities or great distances between them, the Law requires adjustment through a raise in the power of the population or distance figures. The particular power to which the figure would be raised would depend on the specific situation.

In Samples B and BB, formed around the geographic midpoint, the null hypotheses used in the statistical analyses stating that there were no differences in the proportion of respondents buying in Springfield and those purchasing in Columbus was not rejected. However, the midpoint is not considered a good "breaking point" due to many reasons.

In Samples B and BB, the reasoning for the inadequacy of the break-even point determined by the formula used in Samples B and BB ($\text{Distance}/2$) can be realized or recognized through a discussion of the relative advantages and disadvantages of the population variable. Columbus' advantages include the greater selection of establishments and goods offered by them with their correspondingly greater variation in prices and quality. In regard to services, Columbus has more establishments and a wider range of both type and degree of specialty. It offers much more in terms

of attractiveness of amusements, forms of recreation, and other related types of services. Certain specific attractions are The Ohio State University, the Great Western Shopping Center, and The Lazarus Company.

On the negative side, it may be noted that Columbus has much more traffic congestion, both in area amount and degree of congestion in the areas. It is approximately six miles from the corporate limits to the downtown area in Columbus, while only two and one-half miles separate the limits from the downtown district in Springfield. Columbus may have a more acute parking problem due to more and larger businesses in less space (i. e., square footage) in the downtown business district.

Columbus would conceivably have a greater trading area than Springfield because its advantages are seemingly greater than its disadvantages when they are compared to similar features or aspects of Springfield. This would mean that the trading areas for shopping goods, in particular, presumably would extend beyond the 22-mile point (geographic midpoint).

In Combination Samples No. 1 and No. 2 (a combination of Sample A and adjacent Sample B, and Sample AA and adjacent Sample BB, respectively) one can see that the results indicate Columbus' trading areas extend past the geographic midpoint

(22-mile point). But they do not reach the point established through the use of the formula derived from Reilly's Law (31-mile point) for most goods and services, particularly those of the "shopping" type.

The real breaking point should differ with the type of good or service. To illustrate this, results of shopping pattern measurements for an individual convenience good (i. e. , groceries) and an individual shopping good (i. e. , work and school clothes) will be compared in the following section.

Conclusions regarding goods and services

Convenience goods are those goods which customers prefer to purchase "on short notice, with a minimum amount of effort, and, most characteristically of all, at a convenient location."¹²² These goods usually have the smallest trading areas because the number of establishments handling them is relatively large. Also, consumers of these goods typically have a definite need for frequent replenishment. Groceries meet the above requirements fairly well. In the study of grocery purchase patterns the trading areas of Columbus and Springfield were smaller and the total number of respondents purchasing them in the cities were relatively few.

¹²²Clark and Clark, op. cit., p. 163.

Only 16 per cent in Sample A and 12 per cent in Sample AA bought their groceries in Springfield and no per cent in Sample B and two per cent in Sample BB purchased groceries in that town. None in Samples A and AA and 6 per cent in Sample B and 8 per cent in Sample BB bought their groceries in Columbus. This can be substantiated by the fact that almost all of the 11 per cent in both Combination Sample No. 1 and Combination Sample No. 2 had the "bread winner" actually working in the city where the "class" was purchased. These findings correspond to those of Doherty who found from an analysis of data concerning the retail trade area for the Boston area, the food market (i. e. , grocery) was highly decentralized and was not served by a few important centers, as was true in the cases of shopping and specialty goods.¹²³

Shopping goods "are of higher price per unit than convenience goods, and the potential purchaser will make a special trip to several stores to inspect them before arriving at a final decision."¹²⁴ Quality, style, suitability, and price are the common bases of comparison, and a sale depends to a considerable extent on consumer taste. It can be logically reasoned that these goods

¹²³Richard P. Doherty, "The Movement and Concentration of Retail Trade in Metropolitan Areas," The Journal of Marketing, V, No. 4 (April, 1941), 398.

¹²⁴Barker, Anderson, and Butterworth, op. cit., p. 49.

should have larger trading areas than those of convenience goods for the reasons previously stated. Using the "work and school clothes" classification as an example, it can be observed that Springfield attracted 66 per cent in Sample A and 74 per cent in Sample AA, but only two per cent of Sample B. Columbus, on the other hand, attracted 10 and 16 per cent of Samples A and AA, respectively, and 42 per cent of Samples B and BB. In total, 60 per cent of the Combination Sample No. 1 and 60 respondents (all respondents) purchased their non-fashion clothing in one of the two cities, which is a measure of the relative sizes of the trading areas as compared to groceries. This figure grew significantly to 77 per cent in Combination Sample No. 2, which indicates that the people were definitely becoming convinced that the quality, price, and variety of this type of good was appreciably better in the larger cities.

The principle that people will travel farther, and thereby expend a greater amount of effort for shopping goods than for convenience items was proven, as shown in the results. A question arising from these results is, "Why do non-durable shopping goods have a greater number of total respondents buying in the two cities than durable ones when the specific non-durable items mentioned are generally bought locally to a greater extent (because

they are of lower unit value and bought on a more frequent basis)?"

Several possible reasons may be given.

1. In many cases the durable goods, particularly cars, may be traded or purchased from friends, neighbors, or relatives.

2. There are fairly aggressive hardware stores and car dealers in London, Ohio, as can be seen in their advertisements on Columbus radio stations and newspapers.

3. The people may purchase goods locally because of quicker and more personal service.

4. The people may not want to be pressed by the "clever, slippery city salesmen." If they deal locally, they know from whom they are buying.

5. Lazarus and the Great Western Shopping Center in Columbus and Wren's in Springfield appeared to be places where the people were purchasing the majority of their clothing goods. The people were attracted to Lazarus and liked the credit and return policies. They could buy the washers and TV sets there also, but not the automobiles.

Conclusions regarding the relationship between advertising media and the purchasing of goods and services

In regard to the relationship between advertising media and shopping habits, certain results were significant. Newspaper circulations closely paralleled shopping habits. The Springfield newspaper was by far the dominant one in the sample centered around the breaking point as determined by Reilly's Law (i. e., Samples A and AA). Springfield sellers also "monopolized" the market area in goods and services, except music and sporting events which were minor categories in that they had only a few respondents interested in them. Columbus newspapers and sellers dominated the sample centered around the geographic midpoint (i. e., Samples B and BB). Columbus sellers sold less in Samples B and BB than Springfield sellers did in Samples A and AA, partially because:

1. Samples B and BB's geographic center was four miles north of London, Ohio, which had a certain number of favored merchants.

2. Samples B and BB's geographic center was twenty-two miles from downtown Columbus. Samples A and AA's geographic center was only thirteen miles from Springfield's downtown section. The distance from the corporate limits to the downtown section was

much shorter in Springfield than in Columbus, thereby requiring less driving in the city.

Because of the large number of radio stations with relatively small listening audiences, no relationship was found between this advertising medium and shopping habits for various goods and service categories. Television couldn't be related adequately to such shopping habits because the Dayton television station had a smaller audience in Samples A and AA than each of the three Columbus stations and had no audience in Samples B and BB at all.

APPENDIX I
DATA RELATED TO SAMPLE A RESPONDENTS

NON-CONFIDENTIAL CLASSIFICATION INFORMATION FOR
SAMPLE A RESPONDENTS

<u>No.</u>	<u>Name</u>	<u>Address</u>	<u>Occupation</u>
1.	Adams	R. F. D. 1 South Vienna	Foreman
2.	Muir	R. F. D. 1 South Vienna	Farmer
3.	McClennon	R. F. D. 1 South Vienna	Salesman
4.	Dunn	R. F. D. 1 South Vienna	Mechanic
5.	Morris	Urbana Road South Vienna	Welder
6.	Doyle	Urbana Road South Vienna	Farmer
7.	Jones	Old #40 South Vienna	Farmer
8.	Dillard	R. F. D. 1 South Vienna	Buyer
9.	Kripas	R. F. D. 1 South Vienna	Business
10.	Locks	R. F. D. 1 South Vienna	Farmer
11.	Reaver	Houston Pike South Vienna	Truck Driver
12.	Saunders	R. F. D. 1 South Vienna	Social Worker
13.	Chaffin	R. F. D. 1 (H. P.) South Vienna	Laborer
14.	Mast	R. F. D. 1 South Vienna	Farmer
15.	Sweet	Old Col. Road South Vienna	Farmer
16.	Wilson	R. F. D. 1 South Charles.	Farmer
17.	Mitch	R. F. D. 1 South Vienna	Farmer
18.	Trent	R. F. D. 1 South Charles.	Farmer
19.	Poole	R. F. D. 1 South Vienna	Welder
20.	Capper	R. F. D. 1 South Charles.	Press Operator
21.	Waltman	R. F. D. 1 South Vienna	Farmer
22.	Ireland	R. F. D. 1 South Charles.	Farmer
23.	Davis	R. F. D. 1 Mechanicsburg	Farmer
24.	Wilson	R. F. D. 1 South Charles.	Farmer
25.	Boysel	R. F. D. 1 South Vienna	Custodian
26.	Brill	R. F. D. 1 South Charles.	Farmer
27.	Welch	R. F. D. 2 Mechanicsburg	Farmer
28.	Baird	R. F. D. 2 London	Farmer
29.	Woodman	R. F. D. 2 London	Advertiser
30.	Williams	R. F. D. 2 London	Farmer
31.	Harper	R. F. D. 2 London	Farmer
32.	Gordon	R. F. D. 2 London	Self-employed
33.	Baumgardner	R. F. D. 1 South Vienna	Farmer

<u>No.</u>	<u>Name</u>	<u>Address</u>	<u>Occupation</u>
34.	Wells	R. F. D. 2 London	Accountant
35.	Shroyer	R. F. D. 1 South Vienna	No Response
36.	Little	R. F. D. 2 London	Cook
37.	Day	R. F. D. 1 South Vienna	Machinist
38.	Stalley	R. F. D. 2 London	Press Operator
39.	Evans	R. F. D. 1 South Vienna	Job Fitter
40.	Elton	R. F. D. 1 South Vienna	Carpenter
41.	Wiseman	R. F. D. 1 South Vienna	Retired
42.	Dunn	R. F. D. 1 South Vienna	Clerk
43.	Morehart	R. F. D. 2 London	Farmer
44.	Helm	R. F. D. 1 South Vienna	Fireman
45.	Smith	R. F. D. 2 London	Business
46.	Overturf	R. F. D. 2 London	Retired
47.	Huffman	R. F. D. 2 London	Government
48.	Markley	R. F. D. 2 London	Retired
49.	Dever	R. F. D. 2 London	Factory
50.	Stuckey	R. F. D. 2 London	Retired

INFORMATION OBTAINED FROM SAMPLE A
RESPONDENTS

Guide to Data Interpretation¹²⁵

The numbers across (i.e., 1 to 17) represent the particular goods, services, and advertising media that were sampled in the order that they appear in the Questionnaire (see Appendix IV). Therefore, a row of answers represents the seventeen responses given by an individual respondent.

The numbers down (i.e., 1 to 25 and 26 to 50) each represent an individual respondent as he appears on the map of Sample A (see Figure 2). Therefore, a column of answers represents the twenty-five responses given to a particular question by twenty-five respondents. Respondents numbered 1 to 25 were located on the Springfield side of the line drawn perpendicular to U.S. 40 through the breaking point. Respondents with numbers from 26 to 50 were located on the Columbus side of the perpendicular line.

Coding of Responses:

S = Good or service purchased in Springfield
C = Good or service purchased in Columbus
O = Good or service purchased in other towns.
X = No response

¹²⁵Interpretation of information on pages 203 and 204 only.

<u>No.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>
1.	S	S	S	S	S	S	S	O	S	S	S	X	X	O	2	X	S-Sun
2.	O	S	S	O	S	S	S	S	X	S	X	X	X	O	7, 10	WIZE	S-Sun
3.	S	X	S	S	S	C	S	S	S	S	X	O	X	S	2, 10	WLW	S-Sun
4.	S	S	S	S	S	S	S	O	S	S	X	O	X	X	7, 10	X	S-Sun
5.	O	O	S	S	S	S	O	O	S	S	X	X	X	S	4, 7, 6	X	S-Sun
6.	O	O	O	O	O	S	S	O	O	O	X	X	X	O	4, 7	WLW	S-Sun
7.	O	O	S	S	S	O	S	O	S	S	X	X	X	O	7, 4, 10	WIZE	S-Sun
8.	O	S	S	S	S	O	O	O	S	S	X	O	X	S	6, 7	WCOL	S-Sun
9.	S	S	S	S	S	S	S	O	S	S	S	C	X	C	10	WHIO	S-Sun
10.	O	O	S	S	S	S	O	O	S	S	O	O	O	S	4, 6	WIZE	S-Sun
11.	S	O	S	O	S	O	O	S	S	S	X	X	X	S	4, 6	WIZE	S-Sun
12.	S	S	S	S	S	S	O	O	O	S	X	X	X	X	6, 10	WIZE	S-Sun
13.	S	S	S	S	S	O	O	O	S	S	S	X	X	S	7	WBLY	S-Sun
14.	O	O	O	O	O	O	O	O	O	O	X	O	X	O	4, 10	WLW	S-Sun
15.	S	O	S	S	S	S	S	O	S	S	S	S	S	S	7, 10	WLW	S-Sun
16.	O	O	S	S	S	S	O	O	S	S	S	X	X	S	10	WLW	S-Sun
17.	O	O	S	S	S	C	O	O	S	S	S	O	O	S	4, 6	WTVN	S-Sun
18.	O	O	O	O	O	O	O	O	O	O	X	O	O	C	6	WCOL	C-Dis
19.	S	S	S	S	S	S	S	S	S	S	S	S	X	S	4	WIZE	S-Sun
20.	S	S	S	S	X	S	S	S	S	S	S	X	X	S	4	WBLY	S-Sun
21.	X	O	X	O	O	O	S	O	S	S	X	X	X	O	10	WLW	S-Sun
22.	X	S	S	S	S	O	S	O	S	S	X	X	X	X	6	X	S-Sun
23.	X	O	S	O	O	S	S	O	S	S	S	O	X	O	4	WBLY	S-Sun
24.	X	O	S	O	O	O	O	O	S	S	S	O	S	O	4	WCOL	D-Dis
25.	O	O	O	O	O	O	O	O	S	O	X	O	X	O	10	X	S-Sun

<u>No.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>
26.	O	O	S	O	O	O	O	O	S	S	S	X	X	S	10	WBLY	C-Dis
27.	O	O	S	O	S	O	O	O	S	S	O	O	O	O	6	WRFD	S-Sun
28.	O	O	O	O	X	O	O	O	O	O	X	X	X	X	10	WRFD	-----
29.	O	O	C	C	C	O	O	O	C	S	S	O	C	C	4	WLW	S-Sun
30.	O	O	S	O	X	S	O	O	O	S	S	X	X	O	10	WCOL	C-Cit
31.	X	O	S	S	S	O	O	O	O	O	X	O	X	X	10	X	S-Sun
32.	O	O	O	C	O	O	C	O	O	C	X	X	X	X	6, 4, 10	WLW, WCOL	C-Dis
33.	S	S	S	O	S	O	O	O	S	S	S	X	X	C	4	WTVN	S-Sun
34.	O	O	S	O	O	S	S	O	S	S	C	C	C	O	4	WHIO	-----
35.	S	S	S	S	X	O	X	O	S	S	S	S	X	S	4	WLW	S-Sun
36.	X	O	O	X	X	O	O	O	C	C	X	X	X	X	-	WLW	S-Sun
37.	S	S	S	S	S	S	S	O	S	S	X	X	X	X	7	WIZE	-----
38.	O	O	O	O	O	O	O	O	O	O	X	X	X	X	4, 6, 10	X	-----
39.	S	O	S	S	S	S	S	S	S	S	S	O	X	S	7	X	S-Sun
40.	S	S	S	S	O	S	S	S	S	S	X	O	X	S	10	WBLY	S-Sun
41.	O	O	C	S	O	X	O	O	C	O	X	O	X	O	10, 6	WLW, WTVN	C-Dis
42.	X	O	S	X	X	X	X	S	S	S	X	X	X	S	-	WLW	S-Sun
43.	O	O	C	O	O	O	O	O	O	O	C	O	X	C	4	WLW, WCOL	C-Cit
44.	S	O	O	O	O	O	O	O	O	C	C	O	X	S	4	WLW, WCOL	C-Dis
45.	O	S	S	O	O	O	O	O	S	S	X	X	X	X	4	X	C-Dis
																	S-Sun
46.	O	C	C	O	C	O	O	O	C	C	C	X	C	C	4, 6, 10	WBNS, WLW	C-Dis
47.	O	O	O	O	O	C	O	O	O	O	S	X	X	C	10	WTVN	-----
48.	O	X	O	S	X	O	X	X	O	O	X	X	X	X	10	X	C-Dis
49.	O	O	O	S	S	O	O	O	C	O	O	O	O	O	6, 7	WLW, WCOL	-----
50.	O	O	O	O	X	X	X	O	O	X	X	X	X	X	4, 6, 10	WRFD	S-Sun

MAPS OF THE LOCI OF SPECIFIC GOODS AND
SERVICES OBTAINED BY SAMPLE
A RESPONDENTS

LEGEND:

S = Springfield

X = Columbus

O = Other

— = Mile

Fig. 4. --Map of the locus of haircut purchases by Sample A respondents

Fig. 5. --Map of the locus of medical services obtained by Sample A respondents

Fig. 7. --Map of the locus of television set purchases by Sample A respondents

Fig. 8. --Map of the locus of washer purchases by Sample A respondents

Fig. 9. --Map of the locus of automobile purchases by Sample A respondents

Fig. 10.--Map of the locus of grocery shopping done by Sample A respondents

Fig. 11. --Map of the locus of dress clothes purchases by Sample A respondents

Fig. 12. --Map of the locus of work and school clothes purchases by Sample A respondents

Fig. 13. --Map of the locus of motion pictures viewed by Sample A respondents

Fig. 14. --Map of the locus of sporting events attended by Sample A respondents

Fig. 16. --Map of the locus of restaurants patronized by Sample A respondents

ADVERTISING MEDIA UTILIZED MOST
FREQUENTLY BY SAMPLE
A RESPONDENTS

15. Television:

<u>Channels</u>	<u>City</u>	<u>Number of Responses</u>
4	Columbus	22
6	Columbus	15
7	Springfield	11
10	Columbus	23
(Others not recorded)		

16. Radio:

<u>Stations</u>	<u>City</u>	<u>Number of Responses</u>
WLW	Cincinnati	16
WCOL	Columbus	8
WIZE	Springfield	7
WBLY	Springfield	5
WTVN	Columbus	4
WRFD	Columbus(Worthington)	3
(Others not recorded)		

17. Newspaper:

<u>Newspaper</u>	<u>City</u>	<u>Number of Responses</u>
Sun (News)	Springfield	34
Dispatch	Columbus	12
Citizen-Journal	Columbus	2
(Others not recorded)		

APPENDIX II
DATA RELATED TO SAMPLE B RESPONDENTS

NON-CONFIDENTIAL CLASSIFICATION INFORMATION
FOR SAMPLE B RESPONDENTS

<u>No.</u>	<u>Name</u>	<u>Address</u>	<u>Occupation</u>
1.	Houston	R. F. D. 2 London	Contractor
2.	Woosley	R. F. D. 2 London	Farmer
3.	Stires	R. F. D. 2 London	Farmer
4.	Foster	R. F. D. 2 London	Farmer
5.	Burgett	R. F. D. 2 London	Construction
6.	Rogers	R. F. D. 2 London	Farmer
7.	Cunningham	R. F. D. 2 London	Government
8.	Ferguson	R. F. D. 3 London	Farmer
9.	Bell	R. F. D. 3 London	Mechanic Slsmn.
10.	Lombard	R. F. D. 3 London	Manager
11.	Husted	R. F. D. 3 London	Truck Driver
12.	Ardrey	R. F. D. 3 London	Car Dealer
13.	Roberts	R. F. D. 3 London	Farmer
14.	Reynolds	R. F. D. 3 London	Salesman
15.	King	R. F. D. 3 London	Repairman
16.	Bennett	R. F. D. 3 London	Fireman
17.	Braskett	R. F. D. 3 London	Farmer
18.	Adams	R. F. D. 3 London	Electrician
19.	Rowe	R. F. D. 3 London	Factory Worker
20.	Peters	R. F. D. 3 London	Contractor
21.	Chesser	R. F. D. 3 London	Cemetery Kpr.
22.	Wicker	R. F. D. 3 London	Contractor
23.	Casto	R. F. D. 3 London	Factory Worker
24.	Sargent	R. F. D. 3 London	Construction
25.	Barton	R. F. D. 3 London	Farmer
26.	Gammell	R. F. D. 3 London	Farmer
27.	Stites	R. F. D. 3 London	Business
28.	Rector	R. F. D. 3 London	Contractor
29.	McMurray	R. F. D. 3 London	Farmer
30.	Thompson	R. F. D. 3 London	Welder
31.	Whited	R. F. D. 3 London	Press Operator
32.	Peters	R. F. D. 3 London	Factory-Worker
33.	Siebold	R. F. D. 3 London	Cook
34.	Reisinger	R. F. D. 3 London	Farmer
35.	Arthur	R. F. D. 3 London	Unemployed
36.	Mast	R. F. D. 3 London	Farmer
37.	Cooper	R. F. D. 3 London	Farmer

<u>No.</u>	<u>Name</u>	<u>Address</u>	<u>Occupation</u>
38.	Floyd	R. F. D. 3 London	Farmer
39.	Young	R. F. D. 1 W. Jeff.	Nurse
40.	Bennett	R. F. D. 1 W. Jeff.	Farmer
41.	Daniels	R. F. D. 1 W. Jeff.	Maintenance
42.	Sanders	R. F. D. 1 W. Jeff.	Service Att.
43.	Miller	R. F. D. 1 W. Jeff.	Farmer
44.	Knisley	R. F. D. 1 W. Jeff.	Factory Worker
45.	Yates	R. F. D. 1 W. Jeff.	Truck Driver
46.	Vance	R. F. D. 1 W. Jeff.	Maintenance
47.	Gailimore	R. F. D. 1 W. Jeff.	Farmer
48.	Townsend	R. F. D. 1 W. Jeff.	Farmer
49.	Bidwell	R. F. D. 1 W. Jeff.	Farmer
50.	Jones	R. F. D. 1 W. Jeff.	Factory Worker

INFORMATION OBTAINED FROM SAMPLE B RESPONDENTS

Guide to Data Interpretation¹²⁶

The numbers across (i.e., 1 to 17) represent the particular goods, services, and advertising media that were sampled in the order that they appear in the Questionnaire (see Appendix IV). Therefore, a row of answers represents the seventeen responses given by an individual respondent.

The numbers down (i.e., 1 to 25 and 26-50) each represent an individual respondent as he appears on the map of Sample B (see Figure 3). Therefore, a column of answers represents the twenty-five responses given to a particular question by twenty-five respondents. Respondents numbered 1 to 17 and 21 to 28 were located on the Springfield side of the line drawn perpendicular to U.S. 40 through the midpoint. Respondents numbered 18 to 20 and 29 to 50 were located on the Columbus side of the perpendicular line.

Coding of Responses:

S = Good or service purchaed in Springfield
C = Good or service purchased in Columbus
O = Good or service purchased in other towns
X = No response

¹²⁶Interpretation of information on pages 224 and 225 only.

No.	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>
1.	O	O	O	O	O	O	O	O	O	O	X	O	X	O	4	WRFD	C-Dis S-Sun
2.	O	O	O	O	O	O	O	O	O	O	X	X	X	O	10	WOSU	C-Dis
3.	O	O	S	O	O	S	S	O	O	O	X	X	X	O	4	----	-----
4.	O	O	S	O	O	O	O	O	O	O	S	O	X	O	4	WTVN	-----
5.	O	O	O	O	O	O	O	O	O	O	X	X	X	O	6	----	-----
6.	O	O	O	O	O	X	X	O	O	O	X	X	X	X	4, 6, 10	----	-----
7.	C	O	O	O	O	C	O	O	O	O	O	O	C	O	4	WTVN, WCOL	C-Dis
8.	O	O	C	O	O	O	O	O	C	O	S	C	C	C	----	WTVN	C-Dis
9.	O	X	X	C	O	O	O	O	O	O	O	O	O	O	6	WCOL	S-Sun
10.	O	O	C	C	C	O	O	O	O	O	C	C	X	C	6	WTVN	C-Cit
11.	O	O	O	O	O	O	O	O	O	C	X	X	O	O	4, 6, 10	WLW	C-Dis
12.	O	O	C	O	O	O	O	O	C	C	C	X	X	C	4, 6, 10	WTVN	C-Dis
13.	O	O	C	S	S	O	O	O	C	C	X	X	X	O	6, 10	WTVN	C-Dis
14.	O	O	C	C	X	O	O	O	C	C	C	O	X	C	10	WTVN	-----
15.	O	O	O	O	O	O	O	O	O	O	O	O	X	O	4	WCOL	C-Cit
16.	O	O	O	O	O	O	C	O	O	O	C	O	X	C	10	WCOL	C-Dis
17.	O	S	C	O	O	O	S	O	S	O	S	X	X	S	4	WKRC	C-Dis
18.	O	O	C	O	O	O	O	O	X	C	C	O	O	C	6	WTVN	S-Sun
19.	O	O	C	O	O	O	O	O	C	C	C	X	X	C	10	----	C-Dis
20.	O	O	C	O	O	O	X	O	C	C	X	O	O	O	4, 6	WCOL	C-Cit
21.	O	O	O	O	O	O	O	O	C	C	O	O	X	X	6	WTVN	C-Dis
22.	C	O	C	C	X	O	O	O	C	C	X	O	O	C	4, 6	----	C-Dis
23.	O	O	O	O	O	O	O	O	O	O	S	O	X	O	6	WCOL	-----
24.	O	O	O	O	O	O	O	O	C	C	X	X	X	O	6	WCOL	C-Cit
25.	O	O	C	O	O	C	C	C	C	C	C	X	X	C	4, 6, 10	WCOL	C-Dis ²²⁴

<u>No.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>
26.	O	O	C	X	X	O	O	O	X	S	O	O	O	O	10	----	----
27.	O	O	C	O	O	O	O	O	C	C	X	C	O	O	6, 10	WCOL	C-Dis
28.	O	O	C	O	O	O	O	O	C	C	X	X	O	C	4, 10	WTVN	C-Dis
29.	O	O	C	O	O	O	O	O	C	O	X	X	O	O	6, 10	WTVN	C-Dis
30.	O	O	C	O	O	O	O	O	C	O	O	X	X	C	10	WCOL	----
31.	O	O	C	O	O	O	O	O	C	O	X	C	X	C	10	----	----
32.	O	O	C	O	O	O	O	O	C	O	C	O	X	C	6	WBNS, WCOL	C-Dis
33.	O	O	C	O	O	O	O	O	C	O	C	O	O	C	6	WCOL	C-Dis
34.	O	O	C	O	O	O	O	O	C	O	O	O	X	O	4	WRFD	S-Sun
35.	O	O	C	O	O	O	O	O	C	O	X	X	X	O	4, 6, 10	WTVN	C-Dis
36.	O	O	C	O	O	O	O	O	C	O	C	X	X	C	6	----	C-Dis
37.	O	O	C	O	O	O	O	O	C	O	X	X	X	C	10	WRFD, WLW	----
38.	X	O	C	O	O	O	O	O	C	C	C	X	X	C	10	WLW	C-Dis
39.	X	X	C	X	X	X	X	O	C	C	X	O	X	C	10	WCOL	C-Cit
40.	O	O	C	O	O	S	O	O	C	O	X	X	X	X	6, 10	----	C-Cit
41.	O	O	C	O	X	O	O	O	C	O	O	X	X	O	6, 10	----	----
42.	O	O	C	O	X	O	O	O	C	O	O	O	O	C	4	WCOL	C-Dis
43.	O	O	C	O	O	O	O	O	C	O	C	C	S	C	4	WCOL, WTVN	C-Cit
44.	O	O	C	O	O	O	O	O	C	O	X	X	X	O	6	WCOL	C-Dis
45.	O	O	C	O	O	C	C	C	C	C	C	C	C	C	6	WCOL	C-Dis
46.	O	O	C	O	O	C	C	O	C	C	C	O	X	C	4, 6, 10	WCOL	C-Dis
47.	O	O	C	O	O	O	O	O	C	C	X	C	X	O	10	WRFD	C-Dis
48.	O	O	C	O	O	O	O	O	C	C	O	O	O	O	6	----	----
49.	O	O	C	O	O	O	O	O	C	C	X	O	X	O	10	WRFD	C-Dis
50.	O	O	C	O	O	O	O	O	C	C	X	O	X	C	6	WCOL	C-Dis

MAPS OF THE LOCI OF SPECIFIC GOODS AND SERVICES
OBTAINED BY SAMPLE B RESPONDENTS

LEGEND:

S = Springfield

X = Columbus

O = Other

— = Mile

Fig. 17. --Map of the locus of haircut purchases by Sample B respondents

Fig. 18. --Map of the locus of medical services obtained by Sample B respondents

Fig. 19. --Map of the locus of Christmas shopping done by Sample B respondents

Fig. 20. --Map of the locus of television set purchases by Sample B respondents

Fig. 21. --Map of the locus of washer purchases by Sample B respondents

Fig. 22. --Map of the locus of automobile purchases by Sample B respondents

Fig. 23. --Map of the locus of grocery shopping done by Sample B respondents

Fig. 24. --Map of the locus of dress clothes purchases by Sample B respondents

Fig. 25. --Map of the locus of work and school clothes purchases by Sample B respondents

Fig.26. --Map of the locus of motion pictures viewed by Sample B respondents

Fig. 27. --Map of the locus of sporting events attended by Sample B respondents

Fig. 28. --Map of the locus of music events attended by Sample B respondents

Fig. 29. --Map of the locus of restaurants patronized by Sample B respondents

ADVERTISING MEDIA UTILIZED MOST FREQUENTLY BY
SAMPLE B RESPONDENTS

15. Television:

<u>Channels</u>	<u>City</u>	<u>Number of Responses</u>
4	Columbus	18
6	Columbus	27
7	Springfield	0
10	Columbus	24
(Others not recorded)		

16. Radio:

<u>Stations</u>	<u>City</u>	<u>Number of Responses</u>
WLW	Cincinnati	3
WTVN	Columbus	13
WCOL	Columbus	19
WRFD	Columbus (Worth.)	5
(Others not recorded--none had more than one response)		

17. Newspaper:

<u>Newspaper</u>	<u>City</u>	<u>Number of Responses</u>
Sun (News)	Springfield	4
Dispatch	Columbus	32
Citizen-Journal	Columbus	7
(Others not recorded)		

APPENDIX III

DATA RELATED TO SAMPLE AA RESPONDENTS

NON-CONFIDENTIAL CLASSIFICATION INFORMATION
FOR SAMPLE AA RESPONDENTS

<u>No.</u>	<u>Name</u>	<u>Address</u>	<u>Occupation</u>
1.	Ireland	R. F. D. 1 South Vienna	Farmer
2.	Bryant	R. F. D. 1 South Vienna	Truck Driver
3.	McClennon	R. F. D. 1 South Vienna	Inspector
4.	Akers	R. F. D. 1 South Vienna	Butcher
5.	Whitaker	Urban Road South Vienna	Machinist
6.	Doyle	Urban Road South Vienna	Manager
7.	Greene	Old #40 South Vienna	Welder
8.	Dillard	R. F. D. 1 South Vienna	Farmer
9.	Strawsburg	R. F. D. 1 South Vienna	Superintendent
10.	Locke	R. F. D. 1 South Vienna	Farmer
11.	Reaver	Houston Pike South Vienna	Truck Driver
12.	Saunders	R. F. D. 1 South Vienna	Social Worker
13.	Chaffin	R. F. D. 1 (H. P.) South Vienna	Laborer
14.	Hook	R. F. D. 1 South Vienna	Farmer
15.	Sweet	Old Col. Road South Vienna	Retired
16.	Wilson	R. F. D. 1 South Charles.	Farmer
17.	Mitch	R. F. D. 1 South Vienna	Farmer
18.	Sidner	R. F. D. 1 South Charles.	Farmer
19.	Poole	R. F. D. 1 South Vienna	Welder
20.	Capper	R. F. D. 1 South Charles.	Press Operator
21.	Waltman	R. F. D. 1 South Vienna	Farmer
22.	Ireland	R. F. D. 1 South Charles.	Farmer
23.	Davis	R. F. D. 1 Mechanicsburg	Farmer
24.	Wilson	R. F. D. 1 South Charles.	Farmer
25.	Boysel	R. F. D. 1 South Vienna	Custodian
26.	Brill	R. F. D. 1 South Charles.	Farmer
27.	George	R. F. D. 2 Mechanicsburg	Nurse
28.	Baird	R. F. D. 2 London	Farmer
29.	Woodman	R. F. D. 2 London	Retired
30.	Lightle	R. F. D. 2 London	Farmer
31.	Harper	R. F. D. 2 London	Farmer
32.	Reid	R. F. D. 2 London	Foreman
33.	Baumgardner	R. F. D. 1 South Vienna	Farmer
34.	Wells	R. F. D. 2 London	Farmer
35.	Shroyer	R. F. D. 1 South Vienna	Machinist
36.	Little	R. F. D. 2 London	Cook

<u>No.</u>	<u>Name</u>	<u>Address</u>	<u>Occupation</u>
37.	Day	R. F. D. 1 South Vienna	Machinist
38.	Stulley	R. F. D. 2 London	Unemployed
39.	Evans	R. F. D. 1 South Vienna	Job Setter
40.	Griffitts	R. F. D. 1 South Vienna	Welder
41.	Robinson	R. F. D. 1 South Vienna	Laborer
42.	Dunn	R. F. D. 1 South Vienna	Clerk-Bookk.
43.	Morehart	R. F. D. 2 London	Farmer
44.	Downing	R. F. D. 1 South Vienna	Laborer
45.	Smith	R. F. D. 2 London	Business
46.	Overturf	R. F. D. 2 London	Retired
47.	Adrian	R. F. D. 2 London	Caretaker
48.	Markley	R. F. D. 2 London	Retired
49.	Harrington	R. F. D. 2 London	Laborer
50.	Stuckey	R. F. D. 2 London	Retired

INFORMATION OBTAINED FROM SAMPLE AA
RESPONDENTS

Guide to Data Interpretation¹²⁷

The numbers across (i.e., 1 to 17) represent the particular goods, services, and advertising media that were sampled in the order that they appear in the Questionnaire (see Appendix IV). Therefore, a row of answers represents the seventeen responses given by an individual respondent.

The numbers down (i.e., 1 to 25 and 26 to 50) each represent an individual respondent as he appears on the map of Sample A (see Figure 2). Therefore, a column of answers represents the twenty-five responses given to a particular question by twenty-five respondents. Respondents numbered 1 to 25 were located on the Springfield side of the line drawn perpendicular to U.S. 40 through the breaking point. Respondents with numbers from 26 to 50 were located on the Columbus side of the perpendicular line.

Coding of Responses:

S = Good or service purchased in Springfield
C = Good or service purchased in Columbus
O = Good or service purchased in other towns
X = No response

¹²⁷Interpretation of information on pages 245 and 246 only.

<u>No.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>
1.	O	O	S	S	S	O	S	O	S	S	X	X	X	S	10	WBLY	S-Sun
2.	O	S	S	S	S	S	S	O	S	S	S	O	X	X	10, 6	WIZE	S-Sun
3.	S	S	S	O	S	S	S	O	S	S	S	O	X	C	10	WIZE	S-Sun
4.	S	O	S	S	S	S	S	O	S	S	S	S	S	S	2	WIZE	S-Sun
5.	S	S	S	S	S	S	S	S	S	S	S	S	X	S	6, 10	WBLY	S-Sun
6.	S	O	S	O	O	S	S	O	S	S	X	X	S	S	7	WBLY	S-Sun
7.	X	S	S	S	S	S	S	O	S	S	S	S	S	S	7, 10	WBLY	S-Sun
8.	O	S	C	S	O	S	S	O	O	S	C	O	O	C	6	----	-----
9.	S	S	C	S	S	O	S	O	O	O	X	O	S	C	10	WIZE	C-Dis
10.	O	O	S	S	S	O	O	O	S	S	S	S	C	S	6	WRFD	S-Sun
11.	S	O	S	S	S	S	S	S	S	S	X	X	X	S	6, 10	WONE	S-Sun
12.	S	S	S	S	S	S	S	O	S	S	X	S	S	S	6, 10	WIZE	S-Sun
13.	S	S	S	S	S	O	O	O	S	S	S	X	S	S	10	WBZI	S-Sun
14.	S	O	O	O	O	O	O	O	O	O	X	X	S	X	---	WEEC	-----
15.	S	O	S	S	S	S	S	O	S	S	S	X	X	S	4, 10	WLW	S-Sun
16.	O	O	S	S	S	O	O	O	O	S	S	S	S	S	10	WLW	S-Sun
17.	S	S	S	S	S	S	S	S	S	S	S	X	X	S	7	WLW	S-Sun
18.	O	O	O	O	O	S	O	O	O	S	S	O	X	X	7	WONE	S-Sun
19.	S	S	S	S	X	S	S	O	S	S	X	O	X	S	4, 10	WIZE	S-Sun
20.	S	S	S	S	S	S	O	S	S	S	S	X	X	S	6	WBLY	S-Sun
21.	X	O	X	O	S	O	S	O	S	S	S	X	X	S	4	WBLY	S-Sun
22.	X	S	S	S	S	O	O	O	S	S	S	X	X	S	6, 10	WBLY	S-Sun
23.	X	X	S	O	X	S	O	O	S	S	X	X	X	X	4, 10	WBLY	S-Sun
24.	O	O	S	O	O	O	S	O	S	S	S	S	C	S	7	WBLY	S-Sun
25.	O	O	O	C	O	O	O	O	S	S	X	O	X	O	10	WIZE	S-Sun

<u>No.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>
26.	X	O	S	S	X	S	S	O	S	S	S	S	X	S	10	WIZE	-----
27.	S	O	S	O	O	O	S	O	O	S	S	S	C	C	6	WBLY	S-Sun
28.	O	O	O	O	O	O	O	O	O	C	O	X	X	C	10	WTVN	S-Sun
29.	O	O	C	O	O	S	S	O	C	S	C	O	C	C	10	WLW	S-Sun
30.	O	O	S	O	O	O	O	O	S	S	S	C	O	O	6, 10	WTVN	S-Sun
31.	S	O	S	S	S	S	O	O	S	S	X	X	O	O	6, 10	----	S-Sun
32.	O	O	C	C	O	C	O	O	C	C	X	X	X	O	4	WTVN	C-Dis
33.	S	S	S	O	S	S	O	O	S	S	S	X	X	O	7	WRFD	S-Sun
34.	O	O	S	S	O	S	S	O	S	S	X	X	X	S	4, 10	WRFD	C-Dis
35.	S	O	S	S	O	O	S	O	S	S	S	X	X	S	4	WLW	S-Sun
36.	X	O	X	X	O	O	O	O	C	C	X	X	X	X	---	WLW	S-Sun
37.	S	S	S	S	O	S	S	O	S	S	X	X	X	X	4	WIZE	S-Sun
38.	O	O	O	O	O	O	O	O	O	O	X	X	X	X	10	WLW	S-Sun
39.	O	O	S	S	S	S	S	O	S	S	S	X	X	X	10	WIZE	S-Sun
40.	S	S	S	S	S	S	S	S	S	S	S	S	S	S	2, 7	WIZE	S-Sun
																WCOL	
41.	X	O	C	O	C	S	S	O	C	C	S	O	X	C	10	----	C-Cit
42.	X	X	S	X	X	X	X	S	X	S	X	X	S	S	---	WLW	S-Sun
43.	O	O	C	O	O	O	O	O	C	C	X	O	O	X	4	WLW	C-Cit
																	C-Dis
44.	O	O	C	C	C	O	O	O	C	C	S	O	X	C	6	WCOL	C-Cit
45.	O	S	S	S	O	O	O	O	S	S	X	X	X	S	4, 6, 10	WMNI	S-Sun
																	C-Dis
46.	O	O	C	O	C	O	O	O	C	C	C	X	X	O	6, 10	WBNS	C-Dis
47.	O	O	C	O	O	O	C	O	C	C	X	O	X	C	10	WTVN	C-Dis
48.	O	O	O	O	O	O	O	O	O	O	X	X	X	O	4, 6, 10	WLW	C-Dis
49.	O	O	S	C	O	O	O	O	O	S	X	X	X	X	4	WLNO	S-Sun
50.	X	O	X	O	X	X	X	O	O	O	X	X	O	X	10	WLW	S-Sun

MAPS OF THE LOCI OF SPECIFIC GOODS AND SERVICES
OBTAINED BY SAMPLE AA RESPONDENTS

LEGEND:

S = Springfield

X = Columbus

O = Other

= Mile

Fig. 30. --Map of the locus of haircut purchases by Sample AA respondents

Fig. 33. --Map of the locus of television set purchases by Sample AA respondents

Fig. 34. --Map of the locus of washer purchases by Sample AA respondents

Fig. 35. --Map of the locus of automobile purchases by Sample AA respondents

Fig. 36. --Map of the locus of grocery shopping done by Sample AA respondents

Fig. 37. --Map of the locus of dress clothes purchases by Sample AA respondents

Fig. 38. --Map of the locus of work and school clothes purchases by Sample AA respondents

Fig. 39. --Map of the locus of motion pictures viewed by Sample AA respondents

Fig. 40. --Map of the locus of sporting events attended by Sample AA respondents

Fig. 41. --Map of the locus of music events attended by Sample AA respondents

Fig. 42. --Map of the locus of restaurants patronized by Sample AA respondents

ADVERTISING MEDIA UTILIZED MOST FREQUENTLY
BY SAMPLE AA RESPONDENTS

15. Television:

<u>Channels</u>	<u>City</u>	<u>Number of Responses</u>
2	Dayton	2
4	Columbus	12
6	Columbus	15
7	Springfield	7
10	Columbus	29
(Others not recorded)		

16. Radio:

<u>Stations</u>	<u>City</u>	<u>Number of Responses</u>
WMNI	Columbus	1
WLW	Cincinnati	11
WTVN	Columbus	4
WCOL	Columbus	2
WRFD	Worthington (Col.)	4
	Worthington (Col.)	
WBLY	Springfield	10
WIZE	Springfield	11
WONE	Dayton	2

17. Newspaper:

<u>Newspaper</u>	<u>City</u>	<u>Number of Responses</u>
Sun (News)	Springfield	39
Dispatch	Columbus	8
Citizen-Journal	Columbus	4
(Others not recorded)		

APPENDIX IV

DATA RELATED TO SAMPLE BB RESPONDENTS

NON-CONFIDENTIAL CLASSIFICATION INFORMATION FOR
SAMPLE BB RESPONDENTS

<u>No.</u>	<u>Name</u>	<u>Address</u>	<u>Occupation</u>
1.	Houston	R. F. D. 2 London	Sheriff
2.	Woosley	R. F. D. 2 London	Retired
3.	Stires	R. F. D. 2 London	Farmer
4.	Andrix	R. F. D. 2 London	Retired
5.	Burgess	R. F. D. 2 London	Truck Driver
6.	Rogers	R. F. D. 2 London	Farmer
7.	Cunningham	R. F. D. 2 London	Cleaning Lady
8.	Ferguson	R. F. D. 3 London	Farmer
9.	Bell	R. F. D. 3 London	Salesman
10.	Lombard	R. F. D. 3 London	Manager
11.	Hartley	R. F. D. 3 London	Superin- tendent
12.	Andrey	R. F. D. 3 London	Car Dealer
13.	Roberts	R. F. D. 3 London	Farmer
14.	Reynolds	R. F. D. 3 London	Welder
15.	King	R. F. D. 3 London	Unemployed
16.	Bennett	R. F. D. 3 London	Filling Station Attendant
17.	Perry	R. F. D. 3 London	Clerk
18.	Adams	R. F. D. 3 London	Electrician
19.	Rowe	R. F. D. 3 London	Filling Station Attendant
20.	Peters	R. F. D. 3 London	Contractor
21.	Thompson	R. F. D. 3 London	Painter
22.	Murray	R. F. D. 3 London	Retired
23.	Ferguson	R. F. D. 3 London	Air Force
24.	Carter	R. F. D. 3 London	Construction
25.	Barton	R. F. D. 3 London	Carpenter
26.	Gammell	R. F. D. 3 London	Cleaning Lady
27.	Stites	R. F. D. 3 London	Business
28.	Rector	R. F. D. 3 London	Contractor
29.	McMurray	R. F. D. 3 London	Farmer
30.	Tackett	R. F. D. 3 London	Retired (Disabil.)
31.	Lloyd	R. F. D. 3 London	Custodian

<u>No.</u>	<u>Name</u>	<u>Address</u>	<u>Occupation</u>
32.	Reisinger	R. F. D. 3 London	Farmer
33.	Siebold	R. F. D. 3 London	Cook
34.	Collins	R. F. D. 3 London	Mechanic
35.	Storts	R. F. D. 3 London	Welder
36.	Mast	R. F. D. 3 London	Farmer
37.	Cooper	R. F. D. 3 London	Farmer
38.	Floyd	R. F. D. 3 London	Farmer
39.	Griffith	R. F. D. 1 W. Jeff.	Odd Jobs
40.	Bennett	R. F. D. 1 W. Jeff.	Farmer
41.	Daniels	R. F. D. 1 W. Jeff.	Maintenance
42.	Sanders	R. F. D. 1 W. Jeff.	Tire Builder
43.	Miller	R. F. D. 1 W. Jeff.	Farmer
44.	Cotton	R. F. D. 1 W. Jeff.	Contractor
45.	Knisley	R. F. D. 1 W. Jeff.	Factory Worker
46.	Vance	R. F. D. 1 W. Jeff.	Maintenance
47.	Gallimore	R. F. D. 1 W. Jeff.	Farmer
48.	Townsend	R. F. D. 1 W. Jeff.	Factory Worker
49.	Bidwell	R. F. D. 1 W. Jeff.	Farmer
50.	Rowland	R. F. D. 1 W. Jeff.	Railroad

INFORMATION OBTAINED FROM SAMPLE BB
RESPONDENTS

Guide to Data Interpretation¹²⁸

The numbers across (i.e., 1 to 17) represent the particular goods, services, and advertising media that were sampled in the order that they appear in the Questionnaire (see Appendix IV). Therefore, a row of answers represents the seventeen responses given by an individual respondent.

The numbers down (i.e., 1 to 25 and 26-50) each represent an individual respondent as he appears on the map of Sample B (see Figure 3). Therefore, a column of answers represents the twenty-five responses given to a particular question by twenty-five respondents. Respondents numbered 1 to 17 and 21 to 28 were located on the Springfield side of the line drawn perpendicular to U.S. 40 through the midpoint. Respondents numbered 18 to 20 and 29 to 50 were located on the Columbus side of the perpendicular line.

Coding of Responses:

S = Good or service purchased in Springfield
C = Good or service purchased in Columbus
O = Good or service purchased in other towns
X = No response

¹²⁸Interpretation of information on pages 266 and 267 only.

<u>No.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>
1.	O	O	O	O	O	O	O	O	O	O	X	X	O	O	4, 6, 10	WTVN	C-Dis Jour
2.	X	O	O	O	O	O	O	O	O	O	X	X	X	X	10	WTVN	S-Sun
3.	O	O	O	O	O	O	O	O	O	O	X	X	X	S	6	WCOL	C-Dis
4.	S	O	O	O	O	O	O	O	O	O	X	X	X	O	4, 6, 7, 10	O	S-Sun
5.	O	O	S	X	O	O	O	O	S	S	X	X	X	C	X	WCOL WEEC	C-Cit
6.	O	O	C	O	O	X	X	O	O	O	X	X	X	X	10	X	S-Sun
7.	C	C	C	O	X	C	C	O	C	C	C	O	C	C	4	WTVN WCOL WNCI	C-Dis
8.	O	C	C	O	O	O	O	O	C	C	X	O	C	C	10, 4		C-Dis
9.	O	O	C	O	O	O	O	O	C	C	O	O	C	O	6	WMNI	C-Cit
10.	X	O	C	O	C	O	O	O	O	O	C	O	X	C	6	WTVN	C-Dis
11.	O	O	C	O	O	O	C	O	O	O	C	C	C	O	4, 10	WTVN	C-Dis
12.	O	O	C	O	O	O	O	O	C	C	C	X	C	C	4	WTVN	C-Dis
13.	O	O	S	O	S	O	O	O	C	S	X	C	X	C	4, 6, 10	X	C-Dis
14.	O	O	C	O	O	S	O	O	C	C	S	O	X	C	10	WTVN	X
15.	O	O	O	O	O	O	O	O	O	O	X	X	X	X	4	X	C-Dis
16.	O	O	O	O	O	O	O	O	C	C	X	X	X	O	10	WCOL	D-Dis
17.	O	O	O	O	O	O	O	C	C	O	X	X	X	X	10	WTVN	C-Dis
18.	O	O	C	O	O	O	O	O	C	C	C	O	C	C	6	WTVN	C-Dis
19.	O	O	C	O	O	O	O	O	C	C	C	X	X	C	10	X	C-Cit
20.	O	O	C	O	O	C	O	O	O	C	X	X	X	O	4	WLW	C-Dis
21.	O	O	C	O	O	O	O	O	O	C	O	O	O	C	10	WMNI	X
22.	O	O	C	O	O	O	O	O	O	C	X	O	C	C	4, 10	WONE	C-Dis
23.	C	C	O	C	O	O	O	O	C	C	O	O	C	C	6, 10	WBNS	X
24.	O	O	C	O	X	O	O	O	O	C	O	O	X	X	10	WONE	C-Dis ²⁶
25.	C	O	C	O	C	O	C	O	C	C	C	X	X	C	10	WTVN	X ⁶⁶

<u>No.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>
26.	O	O	C	O	X	O	O	O	C	C	O	X	X	X	6	WCOL	X
27.	O	O	O	O	O	O	O	O	O	O	X	O	X	O	7	X	C-Dis
28.	O	O	C	O	O	O	C	O	C	C	C	X	X	C	4	WTVN	C-Dis
29.	O	O	O	O	C	O	O	O	O	O	C	C	O	C	10	WLW	C-Dis
30.	O	O	O	O	O	O	C	O	O	O	O	O	X	O	10	WRFD WTVN WBNS	C-Dis
31.	O	O	C	O	O	O	O	O	C	C	C	X	X	O	6, 10	WLW	C-Dis
32.	O	O	O	O	O	O	S	O	O	O	X	X	X	O	10	WMNI	X
33.	X	O	C	C	O	O	O	O	C	C	X	X	X	C	4, 6	WMNI	C-Dis
34.	O	O	C	O	O	O	O	O	C	C	C	C	O	C	4	WRFD	S-Sun
35.	O	O	C	C	X	C	C	O	C	C	C	C	X	C	10	WMNI	C-Dis
36.	O	O	C	C	C	O	O	O	C	C	C	O	X	O	6	WMNI WRFD	C-Dis
37.	O	O	O	O	O	O	O	O	O	O	X	X	X	X	10	WRFD	X
38.	O	O	C	O	O	O	O	O	C	O	C	X	C	C	4, 6, 10	WOSU	X
39.	O	O	C	O	X	O	O	O	C	C	C	X	X	O	4, 6, 10	X	C-Dis
40.	O	O	C	C	C	O	O	O	O	O	C	O	X	X	6	WCOL	X
41.	O	O	C	C	C	O	O	O	O	C	O	X	X	C	6, 10	WCOL WMNI	X
42.	O	O	C	O	C	O	O	O	C	C	C	X	X	X	X	X	C-Cit
43.	O	O	C	O	O	O	O	O	C	C	C	O	C	O	10	WRFD	C-Dis
44.	O	C	O	C	X	O	C	O	C	C	C	X	X	O	10	WMNI	X
45.	O	O	C	O	O	O	O	O	C	C	X	O	X	O	6	WCOL	C-Cit
46.	O	C	C	C	C	C	O	O	C	C	C	O	O	X	6	WCOL	C-Dis
47.	O	O	C	C	O	O	O	O	C	O	C	X	X	O	4, 6, 10	WRFD	X
48.	O	O	O	O	O	O	O	O	C	C	O	O	X	O	4, 10	WMNI	C-Cit
49.	O	O	C	O	O	O	O	O	C	C	X	X	X	O	4, 10	WRFD	C-Dis
50.	C	X	C	O	O	C	C	C	C	C	X	C	X	C	4, 6, 10	O	C-Dis

MAPS OF THE LOCI OF SPECIFIC GOODS AND SERVICES

OBTAINED BY SAMPLE BB RESPONDENTS

LEGEND:

S = Springfield

X = Columbus

O = Other

= Mile

Fig. 43. --Map of the locus of haircut purchases by Sample BB respondents

Fig. 44. --Map of the locus of medical services obtained by Sample BB respondents

Fig. 45. --Map of the locus of Christmas shopping done by Sample BB respondents

Fig. 46. --Map of the locus of television set purchases by Sample BB respondents

Fig. 47. --Map of the locus of washer purchases by Sample BB respondents

Fig. 48. --Map of the locus of automobile purchases by Sample BB respondents

Fig. 49. --Map of the locus of grocery shopping done by Sample BB respondents

Fig. 50. --Map of the locus of dress clothes purchases by Sample BB respondents

Fig. 51. --Map of the locus of work and school clothes purchases by Sample BB respondents

Fig. 52. --Map of the locus of motion pictures viewed by Sample BB respondents

Fig. 53--Map of the locus of sporting events attended by Sample BB respondents

Fig. 54. --Map of the locus of music events attended by Sample BB respondents

Fig. 55. --Map of the locus of restaurants patronized by Sample BB respondents

ADVERTISING MEDIA UTILIZED MOST FREQUENTLY
BY SAMPLE BB RESPONDENTS

15. Television:

<u>Channels</u>	<u>City</u>	<u>Number of Responses</u>
4	Columbus	18
6	Columbus	20
7	Springfield	2
10	Columbus	31
(Others not recorded)		

16. Radio:

<u>Stations</u>	<u>City</u>	<u>Number of Responses</u>
WLW	Cincinnati	3
WTVN	Columbus	14
WCOL	Columbus	9
WRFD	Worthington (Col.)	7
WMNI	Worthington (Col.)	9
WBNS	Columbus	2
WONE	Dayton	2
(Others not recorded)		

17. Newspaper:

<u>Newspaper</u>	<u>City</u>	<u>Number of Responses</u>
Sun (News)	Springfield	6
Dispatch	Columbus	30
Citizen-Journal	Columbus	7
(Others not recorded)		

APPENDIX V

STATISTICAL SUMMARY OF RESULTS
OF MARCH, 1964 STUDY

1. Good or Service Group	Number of Respondents in Sample A Purchasing in Either Springfield or Columbus	Number of Respondents in Sample B Purchasing in Either Springfield or Columbus	Total Respondents Purchasing in Springfield and Columbus
Barber	Spr. - 16 Col. - 0	Spr. - 0 Col. - 2	Spr. - 16 Col. - 2
Doctor	Spr. - 15 Col. - 1	Spr. - 13 Col. - 3	Spr. - 16 Col. - 4
Christmas Shopping	Spr. - 32 Col. - 4	Spr. - 3 Col. - 31	Spr. - 35 Col. - 35
Television Set	Spr. - 24 Col. - 2	Spr. - 1 Col. - 12	Spr. - 25 Col. - 14
Washer	Spr. - 23 Col. - 2	Spr. - 1 Col. - 9	Spr. - 24 Col. - 11
Automobiles (last two)	Spr. - 35 Col. - 4	Spr. - 5 Col. - 14	Spr. - 40 Col. - 18
Groceries	Spr. - 8 Col. - 0	Spr. - 0 Col. - 3	Spr. - 8 Col. - 3
Dress Clothes	Spr. - 30 Col. - 5	Spr. - 2 Col. - 25	Spr. - 32 Col. - 30
Work and School Clothes	Spr. - 33 Col. - 5	Spr. - 1 Col. - 21	Spr. - 34 Col. - 26
Motion Pictures	Spr. - 17 Col. - 4	Spr. - 4 Col. - 17	Spr. - 21 Col. - 21
Sporting Events	Spr. - 3 Col. - 2	Spr. - 0 Col. - 7	Spr. - 3 Col. - 9
Music Events	Spr. - 1 Col. - 3	Spr. - 1 Col. - 4	Spr. - 2 Col. - 7
Restaurants	Spr. - 17 Col. - 7	Spr. - 1 Col. - 21	Spr. - 18 Col. - 28

2. Income

Coding - 1 - \$ 0-1,999
 2 - 2,000-3,999
 3 - 4,000-5,999
 4 - 6,000-7,999
 5 - 8,000 and over
 6 - No response

Sample A

Income Group	Number of Respondents
1	8
2	11
3	8
4	2
5	10
6	<u>11</u>
	50

Sample B

Income Group	Number of Respondents
1	3
2	6
3	14
4	10
5	8
6	<u>9</u>
	50

Combination Sample

Income Group	Number of Respondents
1	11
2	17
3	22
4	12
5	18
6	<u>20</u>
	100

3. Age

Coding: 1 - 16-25
 2 - 26-35
 3 - 36-45
 4 - 46-55
 5 - 56-65
 6 - Over 65
 7 - No response

Sample A

Age Group	Number of Respondents
1	4
2	12
3	9
4	11
5	8
6	6
7	<u>0</u>
	50

Sample B

Age Group	Number of Respondents
1	7
2	9
3	13
4	11
5	5
6	5
7	<u>0</u>
	50

Combination Sample

Age Group	Number of Respondents
1	11
2	21
3	22
4	22
5	13
6	11
7	<u>0</u>
	100

4. Occupation

Sample A

Occupation Group	Number of Respondents
Farmer	20
Factory and related jobs	10
Business and sales jobs	7
Retired	4
Other	8
No response	<u>1</u>
	50

Sample B

Occupation Group	Number of Respondents
Farmer	18
Factory and related jobs	9
Business and sales jobs	6
Retired	0
Other	17
No response	<u>0</u>
	50

Combination Sample	Number of Respondents
Farmer	38
Factory and related jobs	19
Business and sales jobs	13
Retired	4
Other	25
No response	<u>1</u>
	100

APPENDIX VI

STATISTICAL SUMMARY OF RESULTS

OF JULY, 1967 STUDY

1. Good or Service Group	Number of Respondents in Sample AA Purchasing in Either Springfield or Columbus	Number of Respondents in Sample BB Purchasing in Either Springfield or Columbus	Total Respondents Purchasing in Springfield and Columbus
Barber	Spr. - 19 Col. - 0	Spr. - 1 Col. - 4	Spr. - 20 Col. - 4
Doctor	Spr. - 16 Col. - 0	Spr. - 0 Col. - 5	Spr. - 16 Col. - 5
Christmas Shopping	Spr. - 32 Col. - 9	Spr. - 3 Col. - 33	Spr. - 35 Col. - 42
Television Set	Spr. - 25 Col. - 4	Spr. - 0 Col. - 11	Spr. - 25 Col. - 15
Washer	Spr. - 21 Col. - 3	Spr. - 1 Col. - 8	Spr. - 22 Col. - 11
Automobiles (last two)	Spr. - 49 Col. - 2	Spr. - 4 Col. - 13	Spr. - 53 Col. - 15
Groceries	Spr. - 6 Col. - 0	Spr. - 1 Col. - 4	Spr. - 7 Col. - 4
Dress Clothes	Spr. - 30 Col. - 8	Spr. - 1 Col. - 33	Spr. - 31 Col. - 41
Work and School Clothes	Spr. - 37 Col. - 8	Spr. - 2 Col. - 30	Spr. - 39 Col. - 38
Motion Pictures	Spr. - 24 Col. - 3	Spr. - 1 Col. - 22	Spr. - 25 Col. - 25
Sporting Events	Spr. - 10 Col. - 1	Spr. - 0 Col. - 6	Spr. - 10 Col. - 7
Music Events	Spr. - 10 Col. - 4	Spr. - 0 Col. - 9	Spr. - 10 Col. - 13
Restaurants	Spr. - 23 Col. - 9	Spr. - 1 Col. - 20	Spr. - 24 Col. - 29

2. Income

Coding: 1 - \$ 0-\$1,999
 2 - 2,000- 3,999
 3 - 4,000- 5,999
 4 - 6,000- 7,999
 5 - 8,000 and over
 6 - No response

Sample AA

Income Group	Number of Respondents
1	5
2	5
3	12
4	9
5	9
6	<u>10</u>
	50

Sample BB

Income Group	Number of Respondents
1	4
2	5
3	8
4	5
5	16
6	<u>12</u>
	50

Combination Sample No. 2

Income Group	Number of Respondents
1	9
2	10
3	20
4	14
5	25
6	<u>22</u>
	100

3. Age

Coding: 1 - 16-25
 2 - 26-35
 3 - 36-45
 4 - 46-55
 5 - 56-65
 6 - Over 65
 7 - No response

Sample AA

Age Group	Number of Respondents
1	3
2	10
3	10
4	12
5	5
6	10
7	<u>0</u>
	50

Sample BB

Age Group	Number of Respondents
1	3
2	9
3	20
4	7
5	8
6	3
7	<u>0</u>
	50

Combination Sample No. 2

Age Group	Number of Respondents
1	6
2	19
3	30
4	19
5	13
6	13
7	<u>0</u>
	100

4. Occupation

Sample AA

Occupation Group	Number of Respondents
Farmer	18
Factory and related jobs	14
Business and sales jobs	5
Retired	4
Other	9
No response	<u>0</u>
	50

Sample BB

Occupation Group	Number of Respondents
Farmer	13
Factory and related jobs	8
Business and sales jobs	8
Retired	4
Other	17
No response	<u>0</u>
	50

Combination Sample No. 2

Occupation Group	Number of Respondents
Farmer	31
Factory and related jobs	22
Business and sales jobs	13
Retired	8
Other	26
No response	<u>0</u>
	100

APPENDIX VII

SAMPLE COPY OF THE QUESTIONNAIRE UTILIZED

IN THE STUDY

QUESTIONNAIRE

1. Where is your barber located? _____
2. Where is your doctor located? (Medical) _____
3. Where do you usually do the majority of your Christmas shopping? _____
4. Where did you purchase your last television set? _____
5. Where did you purchase your last clothes washer? _____
6. Where did you purchase your last two cars? _____
7. _____
8. Where do you do most of your grocery shopping? _____
9. Where do you buy the majority of your dress clothes (church, meetings, parties)? _____
10. Where do you buy the majority of your work and school clothes? _____
11. Where do you usually go to see the "Movies?" _____
12. Where do you usually go for most of your sporting or athletic activities or entertainment? _____
13. Where do you usually go for most of your music entertainment or activities? _____
14. Where do you usually go when you dine away from home? (restaurants) _____
15. What is your favorite television channel? If the family differs, which do they usually watch? _____
16. What is your favorite radio station? (If the family differs, which do they usually listen to) _____
17. What newspapers do you presently receive? _____

CLASSIFICATION DATA

Age Coding

16-25 _____	1
26-35 _____	2
36-45 _____	3
46-55 _____	4
56-65 _____	5
Over 65 _____	6
No Response	7

Income

Less than \$2,000 _____	1
\$2,000-3,999 _____	2
\$4,000-5,999 _____	3
\$6,000-7,999 _____	4
Over \$8,000 _____	5
No Response	6

Occupation

Name : _____

Address: _____

APPENDIX VIII

BREAKING POINT FORMULA DERIVATION

Reilly expressed his law in the following equation:

$$\frac{B_a}{B_b} = \left(\frac{P_a}{P_b} \right)^N \times \left(\frac{D_b}{D_a} \right)^n$$

where B_a = the business City A draws from any given intermediate town.

B_b = the business City B draws from that intermediate town.

P_a = population of City A.

P_b = population of City B.

D_a = distance of City A from the intermediate town.

D_b = distance of City B from the intermediate town.

From this he showed that at the breaking point between two cities the business drawn by City A was equal to the business drawn by City B, and since a number divided by itself is 1, $\frac{B_a}{B_b} = 1$. He also pointed out why "N" (the exponent representing the rate at which the outside trade drawn by a city increases as the population of that city increases) equals 1 and why "n" (the exponent indicating the rate at which the outside trade drawn by a city decreases as the distance from the city increases) can be considered 2, due to the fact that it is always closer to that number than any other.

Because of these considerations, the above formula can be reconstructed as follows:

$$1 = \left(\frac{P_a}{P_b} \right)^1 \times \left(\frac{D_b}{D_a} \right)^2$$

This, in turn, can be converted by the following procedure into the formula that was used to determine the breaking point:

$$\left(\frac{D_a^2}{D_b^2} \right) \cdot 1 = \frac{P_a}{P_b} \times \frac{D_b^2}{D_a^2} \left(\frac{D_a^2}{D_b^2} \right)$$

$$\frac{D_a^2}{D_b^2} = \frac{P_a}{P_b}$$

$$\sqrt{\frac{D_a^2}{D_b^2}} = \sqrt{\frac{P_a}{P_b}}$$

$$\sqrt{\frac{P_a}{P_b}}$$

$$D_a = D_b \sqrt{\frac{P_a}{P_b}}$$

$$D_a + D_b = D_b \sqrt{\frac{P_a}{P_b}} + D_b$$

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

$$1 + \sqrt{\frac{P_a}{P_b}}$$

$$\frac{\text{Distance}}{1 + \sqrt{\frac{P_a}{P_b}}} = \text{Miles from City B}$$

BIBLIOGRAPHY

Books

Barker, Clare W., Anderson, Ira D., and Butterworth, J. Donald. Principles of Retailing. 3rd ed. New York: McGraw-Hill Book Co., Inc., 1956.

Beckman, Theodore N., Engle, Nathaniel H., and Buzzell, Robert D. Wholesaling. 3rd ed. New York: Ronald Press Co., 1959.

Berry, Brian J. L. Geography of Market Centers and Retail Distribution. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967.

Brown, Paul L., and Davidson, William R. Retailing: Principles and Practices. New York: Ronald Press Co., 1953.

Cassady, Ralph, Jr., and Ostlund, Harry T. "The Retail Distribution Structure of the Small City," University of Minnesota Studies in Economics and Business. Minneapolis: University of Minnesota Press, 1935.

Christaller, Walter. Die Zentralen Orte in Sudderland. Geneva: Gustav Fischer Verlag, 1933.

Clark, Fred E., and Clark, Carrie P. Principles of Marketing. 3rd ed. New York: The Macmillan Co., 1942.

Converse, Paul D. Elements of Marketing. New York: Prentice-Hall, Inc., 1938.

Converse, Paul D., and Huegy, Harvey W. The Elements of Marketing. 3rd ed. New York: Prentice-Hall, Inc., 1946.

Converse, Paul D., Huegy, Harvey W., and Mitchell, Robert V. The Elements of Marketing. 6th ed. Englewood Cliffs: Prentice-Hall, Inc., 1958.

Converse, Paul D., and Jones, Fred M. Introduction to Marketing: Principles of Wholesale and Retail Distribution. New York: Prentice-Hall, Inc., 1948.

Davis, Ralph C. Industrial Organization in Management. New York: Harper and Brothers, Publishers, 1957.

Hunker, Henry L., and Wright, Alfred J. Factors of Industrial Locations in Ohio. Columbus: The Bureau of Business Research, The Ohio State University, 1963.

Jones, Fred M. A Survey of a Retail Trading Area, Bureau of Business Research Bulletin 44. Urbana: University of Illinois, College of Commerce and Business Administration, 1932.

Losch, August. The Economics of Location. Translated by William H. Waglom and W. F. Stopper. New Haven: The Yale University Press, 1954.

Maurer, J. M., and Starch, Daniel. Analysis of the Tulsa Retail Trade Area. Tulsa: Tulsa Chamber of Commerce, 1931.

Phillips, Charles F., and Duncan, Delbert J. Marketing: Principles and Methods. Rev. ed. Homewood, Ill.: Richard D. Irwin, Inc., 1952.

Reilly, William J. The Law of Retail Gravitation. New York: The Knickerbocker Press, 1931.

_____. Methods for the Study of Retail Relationships. Austin: University of Texas, 1929.

Siegel, Sidney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Co., Inc., 1956.

Von Thunen, Johann H. Der Isolierte Staat in Beziehung Auf Landwirtschaft Und Nationaleconomie. 3rd ed. Berlin: Schumaker-Zarchlin, 1875.

Weber, Alfred. Alfred Weber's Theory of the Location of Industry. Translated by C. J. Frederick. Chicago: University of Chicago Press, 1929.

Williams, James M. An American Town: A Sociological Study.
New York, 1906.

Wright, John S., and Warner, Daniel S. Advertising. New York:
McGraw-Hill Book Co., 1962.

Articles and Periodicals

"The Art of Investigating, Evaluating, and Selecting a New Site,"
Business Management, Vol. XXIV (September, 1963).

Berry, B. J. L., and Garrison, William L. "The Functional
Bases of the Central Place Hierarchy," Economic Geography,
Vol. XXXIV, No. 2 (April, 1958).

Bratcher, Austin S. "A Method of Delineating Retail Trade Zones,"
The Journal of Marketing, Vol. III, No. 3 (January, 1939).

Converse, Paul D. "Comment on Movement of Retail Trade in
Iowa," The Journal of Marketing, Vol. XVIII (October, 1953),
No. 2.

_____. "A Study of Retail Trade Areas in East Central Illinois,"
University of Illinois Bulletin, Vol. XLI, No. 7 (October 5,
1943).

Doherty, Richard P. "The Movement and Concentration of Retail
Trade in Metropolitan Areas," The Journal of Marketing,
Vol. V, No. 4 (April, 1941).

Douglas, Edna. "Measuring the General Retail Trading Area--A
Case Study: I," The Journal of Marketing, Vol. XIII, No. 4
(April, 1949).

_____. "Measuring the General Retail Trading Area--A Case
Study: II," The Journal of Marketing, Vol. XIV, No. 1
(July, 1949).

Golledge, R. G., Rushton, G., and Clark, W. A. V. "Some
Spatial Characteristics of Iowa's Dispersed Farm Population
and Their Implications for the Grouping of Central Place
Functions," Economic Geography, Vol. LXII, No. 3 (July,
1966).

- Goodman, L. A. "Kolmogorov-Smirnov Tests for Psychological Research," Psychol. Bull., Vol. LI (1954).
- Huff, David L. "Defining and Estimating a Trading Area," The Journal of Marketing, Vol. XXVIII (July, 1964).
- _____. "A Probabilistic Analysis of Shopping Center Trade Areas," Land Economics, XXXIX, No. 1 (February, 1963).
- Reed, Eaton V. W. "An Analysis of Retail Trading Relationships of Elgin, Illinois, a Satellite City," Studies in Business Administration, Vol. IX, No. 1 (1938).
- _____. "Discussion," The Journal of Marketing, Vol. V, No. 4 (April, 1941).
- Reed, Virgil D. "Some Statistical Possibilities of Defining Market Limits," The Journal of Marketing, Vol. III, No. 1 (July, 1938).
- Reynolds, Robert B. "A Rejoinder," The Journal of Marketing, Vol. XVIII, No. 2 (October, 1953).
- _____. "A Test of the Law of Retail Gravitation," The Journal of Marketing, Vol. XVII (January, 1953).
- "Selecting the Best Site . . . In the Best Community . . . In the Best Market," Distribution Age, Vol. LXII (July, 1963).
- Seubert, Nelson H. "How Big Is a Market Area?" The Journal of Marketing, Vol. III, No. 1 (July, 1938).
- Smidt, Robert M., and Reis, Irvin L. "Symbolic Logic and Plant Location," Journal of Industrial Engineering, Vol. XIV (Jan. - Feb., 1963).
- Thompson, Donald L. "Future Directions in Retail Area Research," Economic Geography, Vol. LXII, No. 1 (January, 1966).
- Ullman, E. L. "A Theory of Location for Cities," American Journal of Sociology, Vol. LXVI (May, 1941).
- _____. "Trade Centers and Tributary Areas of the Philippines," Geographic Review, Vol. L, No. 2 (April, 1960).