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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

A RETAIL SITE EVALUATION MODEL

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

By

DALE MICHAEL LEWISON

Norman, Oklahoma

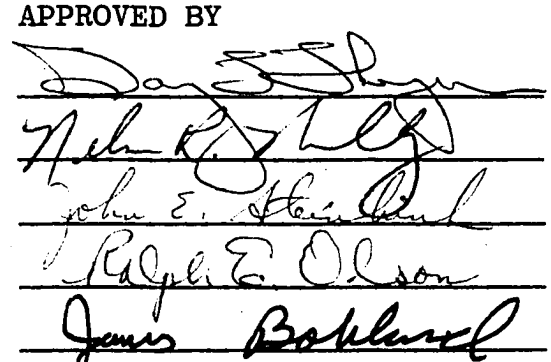
1973

A RETAIL SITE EVALUATION MODEL

A DISSERTATION

APPROVED FOR THE DEPARTMENT OF GEOGRAPHY

APPROVED BY



DISSERTATION COMMITTEE

DEDICATION

To Katherine and Kristopher

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TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS iv

LIST OF TABLES vii

LIST OF ILLUSTRATIONS viii

Chapter

I. THE RESEARCH PROBLEM: RETAIL SITE EVALUATION 1

II. RETAIL SITE EVALUATION AND SELECTION: AN ART OR A SCIENCE 6

The Argument
Approaches to Retail Site Evaluation and Selection
Site Evaluation and Selection Approaches: General Criticisms
The Need for a New Site Evaluation and Selection Model

III. TOWARD A RETAIL SITE EVALUATION MODEL: SOME PERSPECTIVES ON THE PROBLEMS OF SITE EVALUATION 21

Locational Scale Problems
Site Evaluation Problems
Nature of the Site Evaluation Process
The Site Evaluation Problem and the Decision to Locate

IV. TOWARD A RETAIL SITE EVALUATION MODEL: SOME PRINCIPLES OF RETAIL SITE EVALUATION 59

Principle of Generative Location
Principle of Suscipient Location
Principle of Interception
Principles of Cumulative Attraction and Store Association
Principle of Compatibility
Principle of Store Saturation
Principle of Customer Threshold
Principle of Accessibility
Site Evaluation Principles and the Site Evaluation Model

TABLE OF CONTENTS

(Continued)

Chapter		Page
V.	THE RETAIL SITE EVALUATION MODEL	73
	The Selection Act The Measurement Act The Analysis Act The Valuation Act	
VI.	THE CASE STUDY FIRM	101
	The Nature of the Case Study Firm The Firm: Its Managerial Structure The Firm: Its Market Area Structure The Firm's Retailing Environment The Firm's Locational Evaluations and Decisions	
VII.	AN APPLICATION OF THE SITE EVALUATION MODEL	129
	Operational Procedure: Base and Estimation Models The Base Model The Estimation Model The Base and Estimation Models: A Composite	
VIII.	SUMMARY, CONCLUSIONS, AND RESEARCH IMPLICATIONS	194
	Summary Conclusions Research Implications	
CITED REFERENCES		207
BIBLIOGRAPHY		211

LIST OF TABLES

Table		Page
1.	A Selected List of the Elements of the Real-Objective Retailing Environment	49
2.	The Firm's Product Mix	111
3.	Operational Steps: The Base Model	133
4.	Operational Steps: The Estimation Model	135
5.	Total Value of Information; by Type of Interaction and Distance Class	139
6.	Measurement of Relative Location Variables, Sites A-J	142
7.	Rotated Factor Loadings of the Relative Location Variables for Base Model Sites	153
8.	Factor Scores on Factor Dimensions for Sites A-J	154
9.	Average Monthly Sales Volume, July, 1972-June, 1973, Base Model Sites	160
10.	Absolute Residuals, Sites A-J	166
11.	Measurements of Relative Location Variables, Sites K-O	171
12.	Rotated Factor Loadings on the Opportunity Dimension of the Relative Location Variables for Base Model Sites Plus Estimation Model Sites	178
13.	Rotated Factor Loadings on the Attraction Dimension of the Relative Location Variables for Base Model Sites Plus Estimation Model Sites	179
14.	Rotated Factor Loadings on the Exposure Dimension of the Relative Location Variables for Base Model Sites Plus Estimation Model Sites	180
15.	Factor Scores on Factor Dimensions for Sites K-O	182
16.	Average Monthly Sales Volume,July, 1972-June, 1973, Estimation Model Sites	185
17.	Absolute Residuals, Sites K-O	188
18.	Values of the Regression Analysis	191
19.	Absolute Residuals, Sites A-O	192

LIST OF ILLUSTRATIONS

Figure		Page
1.	Origin and Destination of Customers	77
2.	Managerial Structure	103
3.	Marketing Districts: 1973 Case Study Firm	106
4.	Company Owned Restaurants Case Study Firm - 1973	108
5.	Franchised Restaurants Case Study Firm - 1973	109
6.	Operational Procedures: The Base and Estimation Model	132
7.	Dispersional Characteristics of the Relative Location Variables and Average Monthly Sales Volume, by Sites A-J	143
8.	Factor Scores on Factor Dimensions, by Site	155
9.	Base Model, Average Monthly Sales Volume, July 1972 - June 1973	161
10.	Dispersional Characteristics of the Relative Location Variables and Average Monthly Sales Volume, by Sites K-O	172
11.	Factor Scores on Factor Dimension by Site and Evaluation Iteration	183
12.	Estimation Model, Average Monthly Sales Volume, July 1972 - June 1973	186

CHAPTER I

The Research Problem: Retail Site Evaluation

The relatively unimportant role of site evaluation in the retailer's daily operations has often resulted in the use of crude "rules of thumb" and "prejudices" in the site evaluation process. The site evaluation process and the subsequent decision to locate are frequently conducted and made in an unscientific manner. In many cases, the firm's selection, collection, and analysis of retail site data is characterized by subjective procedures which lack the necessary structure for consistent and efficient evaluations. Blackbourn (1973) suggests that the use of systematized procedures in locational problems is ". . . rare with many companies using ad hoc informal procedures which stress personal judgment." (p. 22)

The need for developing models which are capable of handling site evaluations in a routine manner is becoming more apparent as multi-unit retailing firms are required to make more site evaluation decisions. With numerous disastrous locational decisions resulting from personal judgments, Blackbourn (1973) believes that "Companies can be expected to introduce formal procedures to prevent the repetition of past mistakes." (p. 22) However, to date, retail site evaluation models which have been introduced in the literature have

generally been descriptive presentations of the evaluation problem. The descriptions do not contain the necessary information to make the models operational under real business conditions--hence the need for new operational models of site evaluation.

The Research: Its Purposes

The purpose of this research is to develop a site evaluation model which is capable of giving an objective statement as to the place utility of a site to a particular retail firm. Additional purposes are to develop a model which can be quickly operationalized and is inexpensive to implement. Essentially, the purpose is to develop an operational model which is a sequential process of evaluation procedures that expresses the place value to the retailer in terms of the site's potential sales volume. An additional purpose of the model is to demonstrate that a site's potential is, in part, a function of that site's relationship (relative location) with its primary trading area.

The Research: Its Questions

The site evaluation model is presented here to answer such research questions as "Can relative location variables be used to estimate the potential sales volume of alternative retail sites?" and "Can the positional qualities of a site within a defined relative environment (trade area) be used to evaluate alternative sites as to their sales volume potential?"

The Research: Its Premises

The site evaluation model is based on three premises. The first premise is that site-environmental relationships, linkages, and interactions determine to a large extent the value of a particular location. Second, there are surrogate variables (relative location variables) and measurements which can be obtained that express the site-environmental relationships, linkages, and interactions. Third, that these relative location variables can be analyzed to obtain an expression or estimation of the site's potential value to the retailer. In summary, the model to be developed in this research could be termed an ecological model. The simple definition of ecology as the interrelationships of organisms (sites) and their environments would permit such a description of the model.

The Research: Its Organization

The research is divided into two basic parts. Part I consists of the first four chapters and is concerned with the conceptual and operational development of the site evaluation model. Hopefully, it develops a meaningful background for the site evaluation process. Part II consists of the last three chapters. The second part deals with the application of the site evaluation model to the case study firm.

In Part I, the second chapter discusses current site evaluation procedures. A typology of site evaluation procedures is presented and criticisms are made as to the objectivity of those procedures. Chapter II ends with a discussion of

the need for additional objective-operational site evaluation models and a justification for this research effort.

The third chapter presents some perspectives on the problems of site evaluation. It also identifies the perspectives and parameters of the retail site evaluation model. The selectivity of the model with respect to variables and measurements has limited the range of conditions over which it applies, therefore, Chapter III describes the conditions under which the model is operative.

Chapter IV presents site evaluation principles which make a specific contribution to the theoretical considerations of the site evaluation model. Nine principles are selected from the literature of retail location and are used to develop the basic premises of the research model.

The principal purpose of Chapter V is to operationalize the research model with respect to the perspectives, parameters, and principles developed in Chapters III and IV. Chapter V outlines four operational acts which are necessary to systematize the procedures of site evaluation.[1]

The application of the site evaluation model is the concern of the three chapters in Part II. Chapter VI characterizes and describes in general terms the case study firm and its operations. In addition, the chapter will attempt to ascertain which factors could have an influence on the firm's

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[1]The op ational methodology of the site evaluation model is found in Chapter V, therefore, the reader may wish to read Chapter V before proceeding with the reading of Chapters II, III and IV.

sales volume and their possible effects on the reliability of the site evaluation model.

The model is operationalized in Chapter VII. A base model of ten cases (sites) is analyzed in order to obtain the estimating equations. Once the base estimating equations are obtained, they are then used to estimate the potential sales volume of five unknown cases (sites).[2] The reliability of the model is then checked by comparing the estimated sales volume with the actual sales volume to determine the standard error of the estimates.

The final chapter draws conclusions as to the potential use, reliability, and possible modifications of the site evaluation model. In addition, several research implications are discussed.

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[2]The fifteen sites utilized in this research were selected because each site had been in existence for at least one year (an operational life of one year) when this research was initiated. The selection criterion was necessary in order to check the validity of the site evaluation model.

CHAPTER II

Retail Site Evaluation and Selection: An Art[1] or a Science[2]

> It should be emphasized that store site evaluation or store location research is still more art than science
>
> William Applebaum

Applebaum's statement aptly expresses the general concern of this research effort. Can the evaluation and selection of potential retail sites be conducted in a more scientific fashion? Can present locational principles and procedures be utilized in the scientific investigation of retailing sites? Can these principles and procedures be operationalized under real business conditions?

The Argument

Is site evaluation and selection more of an art or a science? The debate of this dichotomy revolves around two points. The first centers around whether there are acceptable theories that have universal application and whether these

---

[1]Art refers to the utilization of essentially subjective principles and procedures in the evaluation and selection of retail sites.

[2]Science refers to the utilization of essentially objective evaluation procedures which are based on theory.

theories are needed. The second point is concerned with the question of whether there are sufficient research techniques and tools for the site evaluation and selection process.

On the first point, Epstein (1972) writes that "geographic and marketing literature is rich in both theoretical and substantive works in regard to choice of retail location . . . ." (p. 192) Applebaum (1965) also suggested that a "significant literature already exists on store location research methodology. A theoretical conceptualization is also evolving." (p. 235) The degree of significance of the literature and its theoretical validity, however, was questioned earlier by Applebaum (1959, 1960) when he called for the development of "clear-cut theories" (p. 113) and of "broader concepts and theoretical formulations without which there is little science." (p. 48) Goldstucker (1966) also questioned the richness of retail site evaluation literature when he wrote,

> Progress of the sort made in plant location and regional studies is lacking in retail store analysis. Most of the attention which has been devoted to this topic has been directed to retail trading areas and shopping center location. Little progress has been made in formulating principles or developing techniques which aid retailers in the selection of specific sites for their outlets. (p. 413)

Some writers have suggested that it is unimportant whether or not there are formal theories of site evaluation and selection. They believe that the "solution to pressing problems in the field does not seem to require the development of formal theories . . . operationally defined concepts are adequate for meeting the recognized needs of marketing

geographers." (Hamill, 1965, p. 12) Green (1961) notes that one advantage of the nontheoretical approach to marketing problems is ". . . the consequent flexibility of the business geographer compared with the often fixed theories of other social sciences." (p. 26) Applebaum (1961) contradicts his earlier statements when he writes "The professional geographer in business cannot expect to find the answers to specific problems in broad generalizations and neat formulas." (p. 49)

The second debate as to whether or not adequate research techniques and tools have been developed tends to be one-sided. Relatively few marketing geographers would make the claim that Epstein (1972) does: "Whether in location or site analysis . . . there are sufficient guides for sound judgment to insure against failure in site development." (p. 199) Rather, most retail site analysts tend to feel that there is an inadequate development of evaluation tools for sound site selection. Applebaum's (1965) article, "Can Store Location Research Be a Science," cites the need for the development of new techniques. He writes that "Up to the present time, multi-unit retail firms, for the most part, have selected store locations on an opportunistic and sometimes on a haphazard basis . . . . We have barely started to deal with the complexities of designing store location strategy models." (p. 236)

Approaches to Retail Site Evaluation and Selection

A review of the retail location literature reveals a lack of reliance on theory. The review produces six basic approaches which, more often than not, have been conducted in a more artistic (subjective) than scientific (objective) fashion. They are: (1) "Site factor checklist" approach, (2) Who? What? Where? Why? approach, (3) "Commercial site typology" approach, (4) "Case study" approach, (5) "N steps to locate" approach, and (6) "Why did you locate here?" approach. It should be emphasized here that the above approaches are not necessarily unscientific by nature, only that their treatment has usually been lacking in many scientific qualities. The six approaches are not intended as a completely exhaustive or exclusive listing of site evaluation and selection approaches; rather, they are presented here as a convenient means of examining the principal procedures by which analysts have examined the problem of evaluating and selecting retailing sites.[3]

"Site Factor Checklist" Approach[4]

The site factor checklist approach has several characteristics. First, the researcher enumerates several general categories of site factors. Second, each general category is divided into a number of subsets of site factors. Third, the

---

[3]It should be noted that in many cases these six approaches are used in combination with each other.

[4]For an example of this approach see B. J. Epstein's article "Geography and the Business of Retail Evaluation and Selection." Economic Geography, 1971, Vol. 47, pp. 192-199.

role of each factor in the site evaluation and selection problem is subjectively portrayed. Finally, generalizations and conclusions of a generally untestable nature are drawn. To use this approach the evaluator simply goes down the list of site factors and checks to see if the site meets certain specified factor criteria. The "best" site is the one in which the greatest number of factors are present in the right combinations.

The criticisms of the checklist approach can be stated as: (1) the rationale associated with the groupings of factors into general categories is usually highly subjective, and therefore the validity of the classification scheme is doubtful; (2) there is no objective specification as to the importance or "weight" that each factor has in the analysis; (3) there is no specification as to how each factor is or can be measured and/or expressed; (4) there is no specification as to how one factor relates to another; and (5) there is no specification as to how one proceeds down the list of factors.

Who? What? Where? Why? Approach

Questions, not answers, are the principal focus of the Who? What? Where? Why? approach. A list of questions that an evaluator should ask about a particular site is the basis of this approach. Selected examples would be: Who are your principal competitors? Who owns the land? What is the street frontage? What is the effect on the site of the visibility and obstructions on the adjacent property? Where is the site

with respect to the central business district? Where are there sites available for competitors? Why has the site not been considered for occupation before? Why are the stores in the vicinity cutting prices?

Supposedly, the site analyst is to find the answers to these questions and, once he has accomplished that, he can then evaluate and select a site. In the final analysis, this approach is similar to the first approach in that a checklist of questions is grouped subjectively; answers are couched in terms of vague roles rather than relationships, functions, variations, or associations. Therefore, with the substitution of the term "question" for the term "factor," the same criticisms can be cited for this approach as was for the former.

"Commercial Site Typology" Approach

The site typology approach is concerned with classification of sites on the basis of some common factor. Several examples of this approach can be cited. One example is the study of retail sites based on the traffic circulatory system. Mertes (1964) cites five site classes--internal, axial, pivotal, peripheral, and external. In another case, Rachman's (1969) criterion for classification was the planned or unplanned nature of commercial business districts. This scheme resulted in the following unplanned site classes: (1) central business district, (2) central business district string stores, (3) secondary business districts, (4) secondary string stores, (5) neighborhood stores, and (6) outlying highway

stores. The planned sites are the central business district, regional, community, neighborhood, and outlying planned shopping centers. Berry (1967) associated certain retail functions with the following urban typology: (1) business centers in the hierarchical structure of convenience, neighborhood, community, regional, and metropolital CBA; (2) ribbons in the form of traditional shopping streets, urban arterial, new suburban ribbon, and highway oriented; and (3) specialized areas such as automobile row, printing districts, entertainment districts, exotic markets, and furniture centers.[5]

The site typologist assumes that once a classification of sites is completed according to some justifiable scheme (in most cases the classification is the evaluation) then, given a particular retail activity, the selection problem is one of selecting the most appropriate type of site within a general site class. This logic is reasonable if the relationship between success and site type have been demonstrated for a particular retail activity. Unfortunately, this is usually not the case; rather, most studies have tended to focus on the classification problem, the description of the site, or the characterization of the retail activities for a particular type of site.

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[5]For a good illustration of these associations, see Figure 2.19. "Typology of business areas within the metropolis" in B. J. L. Berry's Geography of Market Centers and Retail Distribution. Englewood Cliffs: Prentice-Hall, Inc., 1967, p. 46.

"Case Study" Approach

The case study approach has traditionally been one of studying a firm or group of firms with specific problems which must be solved under certain constraints in order to achieve a set of goals. This approach has tended to be more scientific than those mentioned above. Unfortunately, however, subjectivity tends to permeate these studies in the form of generalistic terminology. In addition, this approach lacks objectivity in other ways. First, the central trend seems to be to focus on the case and not on the contribution the case can make to solving general problems. Second, the relationship between the individual case and general conceptual and operational theory is often vague. Finally, this approach stresses the uniqueness of the problem rather than the characteristics which would have general application. In brief, the problem with the case study approach can be simply stated as "how can one decide what is best for the case until one knows what generally works?"

"N Steps to Locate" Approach

A series of steps or guidelines which will lead the evaluator to the solution of the problem provides the format for the "N steps to locate" approach. Applebaum (1966) in his article, "Guidelines for a Store-Location Strategy Study," suggests these steps: (1) define the objective, (2) analyze the economic base, (3) study the population and its characteristics, (4) ascertain the environmental conditions, (5) make an inventory of competition, (6) appraise competition,

(7) study consumer attitudes, (8) study your own company's market coverage and penetration, (9) analyze your own store's performance, (10) appraise your own store facilities and locations, (11) study areas of under-penetration, (12) consider competitors' likely location moves, (13) develop a store-location strategy plan, and (14) calculate your own company's future position in the area. This approach is similar to the site factor checklist and the Who? What? Where? Why? approaches[6] in that the limiting quality of this approach is that, while it tells what to do in more cases than not, it fails to tell how to do it.

"Why Did You Locate Here?" Approach

The "Why did you locate here?" approach is essentially a series of questions directed at the firm's management in an attempt to ascertain the decision criteria for the selection of the firm's present site. If the evaluator can obtain the exact criteria and such supportive materials as (1) why those criteria were selected, (2) what measurements were utilized for each of the criteria, (3) what type of analysis was conducted, (4) under what constraints, objectives, goals, and policies were location decisions made, and (5) the degree of success of the present site, he then has a proven methodological approach for evaluating and selecting additional sites. While this approach combines some of the better elements of

[6]Essentially, the "N steps to locate" approach is also a checklist approach, that is, it is a checklist of procedures. The "N steps to locate" approach is the "factor checklist" approach at a more generalized scale.

the Who? What? Where? Why? approach, it still can be criticized because too much stress is placed on the importance of the so-called personal factors in the location decision. Dickens (1971) criticizes this approach on the basis that "The precise interpretation of such factors is by no means clear and they tell us little about the process of decision making for they are invariably based on ex post facto reasoning often by individuals not involved in the original decision." (p. 426)

Site Evaluation and Selection Approaches: General Criticisms

Several general criticisms can be made concerning the six site evaluation and selection approaches discussed. First, the assumptions made as to the goals, objectives, aspirations, constraints, and policies under which the site evaluation and selection process is conducted were not clearly specified. While each of the above factors will influence the location process, they will tend to exhibit considerable variation from time to time, from firm to firm, and from place to place.

Next, there is poor specification as to what types of information are needed and how this information can be and is obtained. This criticism is valid when the researcher has failed to develop operational definitions. For example, competition is often used as a major locational factor. However, unless there is an exact specification as to what constitutes

competition, it is difficult to determine whether a given retail establishment is considered a competitor or a compatible generator of consumer traffic.

There is poor specification as to the type of measurement used in gathering information. This limitation makes it difficult to test, duplicate, and validate the published results.

The six approaches are generally more static than dynamic in nature in that there is little or no discussion on how the approach adjusts over time to changing locational requirements.

The site evaluation and selection problem is poorly defined with respect to scale; that is, the problem is often confused with the location problems of the regional and trade area scale.

The locational problem is poorly defined with respect to the perspective of the site evaluator or selector. A retailer will view a locational problem from a substantially different viewpoint than would a land developer. The research department of a large franchising firm will view the problem differently from an individual retailer.

Another criticism is that the determination of site alternatives is either treated in a very general fashion or is not discussed at all. The process by which a firm limits its possible alternatives is a critical step in the entire evaluation and selection process. It should therefore be explicitly discussed. The reasons why sites are not selected

may be as important as the reasons for selecting a given site.

And finally, the conceptual framework of each of the six approaches is poorly developed. Little effort is made to integrate the site evaluation and selection process into the total location decision process, a point which will be further elaborated later in the study.

The debate between the scientific and/or artistic nature of the site evaluation and selection problem could be endless. It is sufficient to say that there seems to be reasonable doubt concerning the degree of the scientific involvement in the evaluation and selection of sites. As a rule, it appears that the six approaches cited above lack the rigor required in scientific research. Kerlinger (1973) states that "Scientific research is systematic, controlled, empirical, and critical investigation of hypothetical propositions about the presumed relations among natural phenomena." (p. 11) The site evaluation and selection studies found in the published literature generally do not meet all the requirements set forth in the above definition. However, the six approaches described have contributed valuable insights into the problem of evaluating and selecting retail sites. A review of the literature produced a host of possible research questions, potentially testable hypotheses, rational location principles, relations, and concepts, valuable observations, and numerous potentially sound techniques.

The Need for a New Site Evaluation and Selection Model

The limited scientific quality of contemporary retail site location studies is not justification, in itself, for this research effort. Considering the important role that location has in the successful operation of a retail firm, the currently limited efforts need to be reviewed and revised. As the literature review suggests, there is considerable need for a location model which would contribute to a more scientific approach to the site evaluation and selection problem. A site location model which would meet the rigors of scientific research should include: (1) a clear statement of the research problem, (2) the perspective of the site evaluator, (3) a statement of goals, policies, and constraints under which the model is operative, (4) concise specifications as to the type of information (variables and data) that is needed and how that information can be measured and obtained, (5) a sound rationale for the type of information used (that is, a clearly expressed statement of the theoretical principles selected for the site evaluation process), (6) the elements and procedures for making the model operational in that operational definitions should accompany all elements of the model, (7) the parameters under which the model is operative should be explicitly stated, and (8) a statement of the relationship between the model and the total location decision process. The site evaluation model and the location decision process

presented in Chapters III, IV, and V were developed to include the eight elements stated above, thereby, hopefully, contributing to a more scientific effort in the evaluation and selection of retailing sites.

Several philosophical justifications for this research can also be cited. Throughout time man has tried to foresee what lies ahead. This need for insight into the future has caused man to seek alternatives for predicting future occurrences. While predictive methods have ranged from religious postulations to scientific inquiry, the need to predict appears to be basic to the well being of mankind. What entrepreneur would not agree that successful business operation is dependent upon foreseeing and planning for future conditions? This research treats the need for future insight. The site evaluation model is a predictor that will hopefully be an additional tool in the forecasting of sales volume of a business enterprise.

Justification of this research can be viewed from a different perspective--one of socio-economic waste. The failure of a business enterprise is not only wasteful from the standpoint of the individual entrepreneur(s), but also represents a loss to society in general. Societal losses are several: the entrepreneur's constructive productivity for a given period of time; the misuse of capital invested; the nonproductivity of that particular site; the permanent alteration of site characteristics; the general psychological impact of failure, and numerous opportunity costs. Therefore, any

effort at eliminating this socio-economic waste is justified, both for the individual entrepreneur and society at large.

CHAPTER III

Toward a Retail Site Evaluation Model: Some Perspectives on the Problem of Site Evaluation

The model of site evaluation to be developed in this research is a representation of the site evaluation process. As such, it represents, in generalized form, only the significant features and relationships of that process. Because the evaluation model is selective as to the types of variables, observations, measurements, and analysis, it is limited in the range of conditions over which it applies and the degree of possibility of application. Therefore, this chapter is included in order to identify the retail site evaluation model's principal characteristics and to describe the conditions under which the model is operative.

Locational Scale Problems

The nature of locational problems varies according to their scale considerations. Problems of evaluation are considerably different when viewed as small-scale regional problems, intermediate-scale trade area problems, and large-scale site problems. While it is quite difficult to clearly distinguish among these scales, the following discussion deals primarily with the central problems of each scale.

Regional--Small-Scale Locational Problems

Small-scale location problems are concerned with identifying a general marketing region within which the firm intends to operate. The market region is one which is compatible with the goals and operations defined by the firm. The firm could designate its market region as being international in scope or limit itself to a national or regional marketing system.

The regional location problem of a retail firm is one of identifying the type and extent of the firm's ability to diffuse through space. Several types of spatial diffusion are applicable to the problems of regional market identification. They are expansion, relocation, contagious, and hierarchical. (Gould, 1969, p. 3-4)

When a firm decides to gradually expand its operations through a market area in such a manner that the total number of sites (total market area) becomes greater and greater through time, the resulting marketing region is defined by a process termed expansion diffusion.

If a retail firm decides to move all its outlets to an entirely new set of sites, the new marketing region could be described as being defined by the process of relocation diffusion. An example of relocation diffusion is the complete abandonment of the C.B.D. for suburban locations.

A regional market is defined by contagious diffusion when the retail firm decides to saturate a given market area; that is, to locate outlets in such a manner that the trading

area of those outlets forms one contiguous marketing region. In the case of contagious diffusion the distance of new market areas from the original market is minimal. Contagious diffusion decisions are made by the retailer in the belief that this is the most efficient means of reducing to an acceptable level the frictional effect of distance, in other words, to maximize the transferability of the consumer in regard to the firm's outlets.

The regional marketing problem of many firms can be identified by examining the hierarchical diffusion process which characterizes those firms. In identifying the regional market, a firm may decide to leap over many intervening cities and/or areas and develop large cities and/or areas which are at a considerable distance from the original market area. The motivation of this decision to diffuse in a hierarchical fashion is highly related to the population-customer threshold required by a firm for successful operations. In addition, if the firm wants to expand its regional market area rapidly, the hierarchical diffusion process is one often chosen. One of the results of this process is usually "gap" areas in the firm's marketing region; however, in time these gaps could be filled in by the process of expansion and contagious diffusion.

Regional market area problems are not limited to identifying the type of spatial diffusion process which was used or which should be used in defining the regional market. The firm must also be aware of regional locational problems in the form of barriers. Such barriers as competition, cultural and

economic traits of the consumer, legal constraints, and the required retailing practices related to the goods and services, communications, and physical distribution mix all limit the size, direction, and shape of the firm's regional market.

Trade Area--Intermediate-Scale Locational Problems

Once the firm has defined its regional market(s) it must then identify trading areas within the region that are the most appropriate for the firm's retailing activities. The intermediate-trade area problem is one of defining, evaluating, and selecting areas within the regional market in which the potential consumer demand is sufficient to meet the business aspirations of the firm. A few selected examples of trade area definitions should suffice to give the reader a characterization of the intermediate scale problem. Huff's (1964) definition of a trade area is "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." (p. 38) Applebaum and Cohen (1961) suggest as a broad definition for trade area ". . . the area from which a store gets its business within a given span of time." (p. 15) A drawing power definition was suggested by Fine (1954), who writes that the trading area is ". . . that area from which the community receives approximately 90 per cent of its total retail patronage." (p. 11) Another drawing power definition is ". . . the area

of influence from which a shopping center could expect to derive as much as 85 per cent of its total sales volume." (Gruen, 1960, p. 278) Green suggests a per capita sales definition for the trading area of a general merchandise store as ". . . that area which will provide a minimum annual per capita sale of one dollar." (Applebaum, 1961, p. 14) As the above definitions indicate, the trade area problems of the retailer will exhibit considerable variance depending upon the locational strategy of the firm.

All the above definitions have two common characteristics. First, they identify the area from which a business unit can draw customers over a finite time span. Second, they normally have a single focal point (a town, a shopping center, or a single retail outlet) from which the delineation of the trade area is made. The second characteristic is disturbing because it tends to limit the trade area problem to one of a gravity or central place perspective in that a site alternative is given and the problem is to determine "how much of" and "to what extent" can the surrounding area be attracted to the site. The measurement of "how much of" and "to what extent" is usually on the basis of some given variable such as per capita sales or sales volume.

In this gravity-central place problem the perspective of the evaluator is one of being within the area and looking outward. In the case of defining trade area for small local communities, this outlook may be the only realistic perspective. However, in defining trade areas within a large

metropolitan area the gravity-central place perspective seems inappropriate in the initial stage of the trade area delineation and analysis. A large metropolitan area could conceivably consist of an almost indefinite number of definable trade areas. To follow the gravity-central place perspective would be a very inefficient and expensive means of finding trade areas which would satisfy the firm's locational requirements.

The nodal approach to trade area delineation and analysis should be preceded by a set of procedures which would allow the evaluator to delineate several potentially viable trading areas within a particular market region (for example, a metropolitan area). One way of handling the delineation of these potential trade area surfaces would be to take a regional-overlay approach consisting of the following procedures. First, identify the size of an areal overlay or a floating grid (a theoretical trade area) which would be appropriate to the locational requirements of the retail firm. For example, the area overlay could be a one-two-three-etc.-mile radius. Second, identify those dimensions, factors, or relationships which are necessary to the successful operation of a retail outlet. Third, plot these evaluation factors on the appropriate metropolitan maps. Finally, place the areal overlay over the constructed maps and by shifting the overlay, identify those trading areas on the map which would provide the firm with a reasonable set of locational factors. Essentially, the regional-overlay approach is a total perspective in the sense

that the observer is above the observation plane looking at the complete locational problem.

The intermediate locational problem is one in which the analyst attempts to find a set of characteristics (a potential surface) within a defined area that has a reasonable probability of generating a sufficient business volume. Once the potential surfaces have been delineated, the evaluator then proceeds to delineate and analyze the nodal trade areas.

Site--Large-Scale Locational Problems

The large-scale site problem concerns itself with the evaluation and selection of particular points in space. The site evaluation model presented in this research is concerned with this large-scale problem. The remainder of this chapter is devoted to outlining the dimensions and characteristics of the large-scale problem.

Site Evaluation Problems

There are several site evaluation problems. These relate to: (1) the evaluator's perspective, (2) the number of evaluators, (3) the type of response to locational stress, and (4) the number of site alternatives. Each of these problems provides the central focus of discussion in the following sections.

Evaluator's Perspective

The nature of a site evaluation problem will vary extensively depending on the particular viewpoint of the

evaluator. Problems of site evaluation can be viewed from the perspective of a regional planner, a land developer, or a businessman. The regional planner's problem is finding a reasonable match between a set of activities and a set of locations. The problem of finding a reasonable activity for a given location is the land developer's problem; it is also referred to as the chamber of commerce problem. The businessman's problem is one of finding a reasonable location for a given activity. The site evaluation model developed here is of the last type, that is, finding a reasonable location for the retailing activities of a self-service steak restaurant firm.

Number of Evaluators

Site evaluation procedures and location decisions are, in part, a function of the size and number of evaluators and decision makers. In some cases the responsibility for making evaluations is entirely in the hands of a single individual; for example, the owner and operator of a single retail unit. In other cases, evaluations and decisions are made by a multi-decision unit such as a business firm or organization. In the latter case, the understanding of the total decision and evaluation process is far more difficult than in the similar former case. Dickens (1971) supports this view in his statement "The basic decision unit in the business context is the business organization or firm and this is a far more complex structure than say, the consumer making a shopping decision."

(p. 426) The complex locational decision and evaluation structure of a firm can be viewed as the sum total of the individuals involved. Krumme (1969) suggests that there is not only a difference in the decision-making structure between single and multiple decision units, but that the decision process differs with the size of the multiple decision unit. "Decision-making in the large multi-plant and multi-regional corporation is distinctly different from that in the small-to-medium one-plant firm." (p. 31) Krumme continues to suggest that this small firm approach has been the 'center of traditional thinking' for the geographer's concept of spatial decision making, and that possibly this is why the geographer's decision-making models have been of a limited value.

The location decision and evaluation perspective of the site evaluation model developed in this research is that of a multi-unit firm. The model is capable of evaluating an indefinite number of sites and is structured in such a manner that it can be adapted[1] for use by any number of different evaluators. In addition, it can also be adapted for use by almost any type of convenience goods retailing firm.

Response to Locational Stress

Locational stress can be generated from within the firm by changes in its internal environment or from outside the firm by changes in its external environment. The desire

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[1]The necessary adaptions will become apparent in the discussion of the site evaluation model in Chapter V.

of the firm's management to acquire additional operating space, to increase the firm's share of the market, and to expand spatially are all good examples of stress which is generated from within the firm. Examples of external stressors would be a changing sales volume, a change in the share of the market, and a change in the firm's trading area. Whatever the cause of locational stress, when it reaches the critical threshold level, a firm will attempt to identify the various alternative courses of action. For example, if a firm's average share of the general foodstuffs sales had been 50 per cent of a given trade area and its market share had fallen to the firm's break-even point of 35 per cent (with the firm defining this point as the critical threshold level), the firm must initiate some action or suffer the consequences of its inaction.

Lloyd (1972) identifies three alternative courses of action to locational stress which has exceeded the tolerance threshold. They are: (1) in situ adjustment, (2) branch expansion, and (3) new expansion. (p. 148-150)

In response to locational stress, many retail firms will attempt to adapt to the changing environmental circumstances by adjusting at their existing location. Such in situ adjustment may include the adding to or remodeling of the present site to acquire additional sales space or to create a new image. It could also include a lowering of prices, a change in the goods and service mix, or an increase in the advertising expenditures as a response to a decreasing sales

volume and a fallen market share. Whatever the in situ response, the firm experiences spatial repercussions. If these repercussions are tolerable, then the adjustment is successful. If the spatial repercussions exceed a tolerable level, the firm may try a new in situ adjustment or go to one of the other alternative courses of action. Lloyd (1972) states that "This form of adjustment to stress by remaining at the existing locations is probably the most common for the majority of firms apart from those that are highly sensitive to changes in the spatial patterns of demand, for example, supermarkets and similar retail functions." (p. 148) However, many retail firms exhibit a strong reluctance to move because of the known certainty of the present site and the high degree of uncertainty attributed to new sites. In addition, retail firms often show reluctance to relocate because of the fixed capital invested at the present site, the cost of acquiring a new site, and the interruption to present retailing activity.

The second alternative open to the retail firm in its attempt to mitigate against locational stress is to establish a branch outlet. For many firms this course of action is the most desirable because it allows the firm the certainty of the original site(s) and at the same time it permits the firm to gain increased coverage in a new market area. In addition, branch expansion creates a greater potential sales volume and tends to satisfy the management desires of diversification, investment, growth, and scale economies.

The final course of action the firm can pursue in order to deal with locational stress is to establish a new outlet. This alternative can be differentiated into two cases; first, the single-unit firm which is substituting one site for another, and second, the multi-unit firm which is adding a new site as part of an expansion program. In the first case, the selection of a new alternative is perceived to be a drastic action and one which is chosen under conditions of great uncertainty. On the other hand, in the case of the multi-unit retail firm, this alternative offers not only the certainty of several established locations but also a feasible means of dealing with what locational stress it is experiencing. Also, the multi-unit firm usually has considerable experience in the selection of new sites so that the degree of uncertainty is a great deal less than that of the single-unit case.

In this research, the site evaluation model was developed primarily to handle the multi-unit new expansion case. While adjustments could be made to handle the branch expansion case,[2] it will not be done in this effort due to economics of space and time.

Number of Site Alternatives

The number of site alternatives which are available to a firm are numerous, however, site alternatives are not given,

[2]Branch expansion is defined as the addition of a new outlet which is considered to be only an extension of a parent outlet. A branch is usually a smaller operation. Branch department stores and branch banking are examples.

but must be searched for. Firms exhibit great variation in their willingness and ability to seek out alternative sites. The site evaluation model presented here does not make any judgments as to how firms select site alternatives. The model is simply capable of evaluating any or all alternatives presented to it by the firm's management. Determination of alternatives is part of the firm's locational search process and will be discussed later as part of the location decision process.

Nature of the Site Evaluation Process

Site evaluation models have often been of a superficial nature with a limited use quality. This nonoperational quality is generated from an unrealistic perspective of the site evaluation problem. The site evaluator who fails to obtain an operational solution has generally failed to understand and identify the nature of the site evaluation problem. Specifically, the site analyst has neglected one or more of the following perspectives: (1) site evaluation is a relative location problem; (2) site evaluation is a problem of communalities, not a uniquenesses problem; and, (3) site evaluation is a utility assignment problem.

Site Evaluation: A Relative Location Problem

The concept of site is a spatial one. The concept of space is viewed as having a dualistic nature, absolute and relative. The absolute view of space is traced by Harvey

(1969) back to the Kantian philosophy of space where it was considered neither a thing or event, but ". . . a kind of framework for things and events; something like a system of pigeon-holes or a filing system, for observations." (Popper, 1963, p. 179) Harvey continues to say that while ". . . much of the philosophy of geography thus stems from a 'container' view of space . . . there has been little examination of the justification of this concept in geography." (p. 208) The lack of a sound justification for the absoluteness view has led many contemporary geographers to view absolute space as nothing more than an infinite number of points, pigeon-holes, or files defined by some form of a grid reference system. Absolute location has come to be considered as simply one of those points, pigeon-holes, or files. Adams, Abler, and Gould (1971) echo this viewpoint when they define absolute location as ". . . a position in relation to a conventional grid system designed solely for locative purposes." (p. 59) Hurst (1972) refers to absolute location as ". . . no more than a grid coordinate reference on a map, an actual point in space." (p. 23) It seems therefore, that the only meaning that can be attached to a site from the absolute viewpoint is one of "whereness" with respect to a grid coordinate reference system.

Relative space can be defined as the aggregate of all absolute locations and the relationships that exist between them. These relationships can be thought of as various types of coordinate systems. From a relative spatial viewpoint, the problem becomes one of identifying ". . . the coordinate

system which is most appropriate for a given geographic purpose." (Harvey, 1969, p. 73) Jammer considered relative space to be the ". . . positional quality of the world of material objects or events." (Harvey, 1969, p. 195) For practical purposes, geographers have developed the more limited concept of relative location which is simply ". . . a position with respect to other locations." (Adams, Abler, and Gould, 1971, p. 59) Hurst (1972) views relative location as one step beyond that of absolute location in that it incorporates the concept of links between points--"links in the form of flows of goods, people or information." (p. 23) It is this additional step that allows a site to take on meaningful characteristics which can be analyzed and therefore evaluated in a scientific manner.

Every retail outlet has an absolute location in the form of a grid coordinate, but the outlet is not an activity unto itself. "Rather, it is part of a larger (retailing system), within which the (outlet) has a particular situational relationship. So the (outlet) is not a separate entity, but an activity that has contacts or relations with other sites, places, and activities. The differential association and location of activities over space and time imply a pattern or mutually oriented interaction system." (Hurst, 1972, p. 23)

The site evaluation model utilizes the concept of relative location which in turn incorporates the idea of links and relationships between places in terms of consumer flows. It

is these relationships and linkages that give a site meaning in a spatial interaction sense, and it is the variation in the relationships that is the focus of the evaluation model. The model evaluates a site on the basis of its relative location within a retailing environment; that is, a site is assigned a value statement (sales volume) on the bases of the type and degree of interactions within the retailing environment (trade area) which is relevant to the site being evaluated.

There is considerable variation in the sales volume potential between retailing environments-trading areas. Also, the sales potential varies from one site to another within a particular retailing environment. It is this environment-to-environment and site-to-site variation that is evaluated and used in the model to predict the potential sales volume of site alternatives. In other words, sales volume potential is estimated for a particular site by evaluating that site's relative location within a defined trade area.

Site Evaluation: A Problem of Communalities

Retail site analysts have been intrigued by the mythical site uniqueness concept. Anderson (1965) observed that ". . . every retail store is truly unique at least in one of its fundamental characteristics, namely, location." (p. 211) Several writers have commented on this uniqueness factor and have described it as one of the retailer's principal tools in obtaining and maintaining a "competitive advantage" and/or

"spatial monopoly." Mertes (1964) states that "The location of a given retailer is unique. Once he has chosen the site, the space cannot be occupied by another. Through his desirable location, he thus achieves an advantage that is his alone. Merchandise may be duplicated, promotions can be imitated, and prices will be met, but a retailer's locational advantage is difficult to assail or neutralize." (p. 20) He continues, that "No one enters business except in the expectation of some degree of differential advantage in serving his customers . . . competition consists of the constant struggle to develop, maintain, or increase such advantages. Since an advantageous spatial position is less vulnerable to competitive attack than any other, a retailer should make every effort to find a unique location for this type of business." (p. 20) Gruen (1967), in his attempt to determine the optimum location for a retail firm by a behavioral approach, rationalized that "a retail firm's selection of a particular site commits it to the rental or purchase of a spatial monopoly." (p. 320) In addition, Gruen concludes that ". . . the demand for the services or products of the firm is as unique as the demand that pertains to each particular location." (p. 320)

It can be argued that the site uniqueness concept discussed above is phenomenological, while a communalities perspective of site is more in tune with the principles of scientific inspection. Sites are unique when one assumes the absolute view of space; that is, sites are "one of a kind" files or pigeon-holes ". . . concerned with unique collections

of events and objects." (Harvey, 1969, p. 70) In the absolute sense of location, a site is unique with respect to a grid coordinate system. This unique concept of site suggests a "soleness" or "singleness" of variables for scientific inquiry, a condition not conducive to contemporary scientific methodology.

On the other hand, if one assumes the relative view of space the ". . . uniqueness of locations has to be profoundly modified. Within any coordinate system locations may be uniquely determined, but the relative view of space postulates an infinite number of possible coordinate systems" (Harvey, 1969, p. 73); that is, an infinite number of common relationships. Therefore, given a relative view of space, "Locations are either not unique or, at best, unique only within a selected coordinate system." (Harvey, 1969, p. 73) With the relative perspective of space and its associated concept of commonness, sites can have either a single or multiple variable dimension, a condition that is conducive to contemporary scientific inquiry.

The second argument is stated by Harvey (1969): "One of the major arguments against the uniqueness thesis . . . is that it is difficult to provide a realistic framework for explaining and describing without doing violation to the notion of uniqueness." (p. 75) Hurst (1972) supports this argument when he writes that "Unique phenomena cannot be explained, or to put it another way, to generalize about something is to say what it has in common with something else, . . . if we do

not admit the possibility of similarity, the concept of uniqueness has no real meaning. For unless by argument based on analogies between situations we look for common denominators, unless we seek norms or standards, no single case can ever be described as unique." (p. 5) Hence, if one does provide a realistic framework--a commonness perspective, for explaining and describing--he does so at the expense of the "oneness" definition of uniqueness, but if one does not provide this framework, he fails to give any true meaning to the uniqueness concept and without a meaningful concept there can hardly be a scientific investigation.

The final argument is that the uniqueness perspective would negate the use of most scientific tools. For without common trends, patterns, distributions, central tendencies, variations, and dependencies in variables, scientific inquiry would be limited, if not impossible.

The site evaluation model is based on the premise that for any particular type of retail activity there are certain common location factors or dimensions which are associated with the performance of retail outlets at various site alternatives. These common location factors will vary in strength and importance from one site to another and from one retailing environment to another. It is this variation in the common factors that is utilized by the model to evaluate the alternative sites as to their potential sales volume performance. In summary, the model compares or evaluates alternative sites

on the basis of factors which sites have in common and not on any unique factor a site may possess.

Site Evaluation: Utility Assignment Problem

In order to evaluate a searched alternative, there must be some way to prescribe meaning to that alternative. One means of prescription is to assign an alternative a "utility function." The concept of utility has been an important consideration of economic thought since Jeremy Bentham's 1823 essay An Introduction to the Principles of Morals and Legislation. (Page, 1968, p. 3) In this research effort the concept of utility will assume an important operational role in the site evaluation model.

The concept of utility can be broadly defined as ". . . the ability of something (usually a process of some sort) to satisfy a want or need." (Markin, 1971, p. 13) Utility has also been defined as ". . . what is added to resources when they are converted into something useful to man." (Hurst, 1972, p. 12), and as ". . . a value placed by the organism upon each of the possible outcomes of choice" (Simon, 1952, p. 102), and finally, as something that is ". . . created by human values and human intervention." (Hurst, 1972, p. 12) Each of the above definitions suggests a certain aspect of the utility concept; the first tells what it does; the second and third describe in different manners what it is; and the fourth definition determines how it is created. In turn, however, each of these definitions creates certain problematic concerns.

If utility is defined as the ability of a process to satisfy wants and needs, then both the process and whose wants and needs must be identified. In the model presented here, the process is that of location and the wants and needs are those of a regional chain of steak restaurants. An expression of site utility allows the firm to judge whether or not the locational characteristics of a particular point in space are capable of meeting the wants and needs of the firm as defined by the firm's locational goals and aspiration levels.

The second definition of utility suggests an additive concept whereby a resource becomes useful to man. The nature of this additive needs to be clarified. What is added to resources to make them useful? In traditional economics, resources have been made useful by the addition of form, time, place, and possession utility. (Markin, 1971, p. 13) From a broad economic viewpoint, form utility is thought of as that which results from the economic activity of agriculture and manufacturing; place utility is added by man through his transportation activities; time utility is a function of the warehouse and storage sector; and finally, selling (retailing) is the activity which adds the possession utility.

Each utility type can be viewed from a more limited perspective--that of the retail unit. In a restricted sense, retail establishments add form utility by changing bulk characteristics of a product; in some cases it is a "break in bulk," at other times it is "assemblage to bulk." Time utility is added by the retailing sector in that it offers for

sale products at times when those products are wanted and desired by the consumer. A good example of retail time utility is the special products offerings prior to gift-giving holidays. Retail establishments add place utility in that, of all economic activities, their site and relative location characteristics are the most in tune to the spatial needs and behavior of the final consumer. Finally, the retailer's concern with promotion and advertising, personal selling, store design and layout, product offerings, pricing structure, customer services, and consumer behavior are all reflective of his effort to create possession utility.

The above typology of utility can also be applied to the kind of firm that is the focus of this study--a regional chain of self-service steakhouses. In the preparation of food, a restaurant most assuredly adds form utility. The fact that its product and service offerings are demanded and consumed at two peak periods--the noon and dinner hours, suggests that time utility is also created. While the variation in sales volume and customer attraction reflects the utility of various sites, the firm's expansion program is viewed by its management as creating a set of place utilities in the Great Plains Region of the United States. The firm's special attention to the type of service (personal or self-service), the pricing structure (low or economical), and promotional effort (free ice cream and discount coupons) all indicate the attempt at creating a possession utility.

While the third definition of utility deals with the assignment of a value to a particular alternative, the final definition states that it is a product of the human value system. Therefore, the assignment of a value-utility to a particular alternative is a behavioral act. However, behavioral acts and the type of value assigned can be thought of as being conducted under the conditions of subjective-uncertainty and objective-certainty.

In the subjective-uncertainty case, the value which is assigned to a particular alternative is an estimate of worth based upon the evaluator's personal feelings and intuitions. Usually the value statement is in the form of descriptive adjectives, for example, excellent, good, fair, poor, large-small, best-worst, and so on. The reason why subjective value statements are used is because they represent a multitude of variables, many of which can only be measured and expressed in general terms. Subjective values under uncertainty cannot be assigned probabilities, that is, a numerical expression of the confidence that a certain value will result if a certain behavioral act is implemented.

In summary, values of a subjective nature are encompassing expressions of utility that are used to express complex behavioral evaluations.

Assigned values under conditions of objective-certainty are estimates of worth based upon a formal set of evaluation procedures. Objective value statements are expressed in precise terms having explicit meanings. Numerical expressions

are the most common, however, such statements as "greater than," "less than," and "equal to" are also common to this type of value statement. In addition, confidence levels can be determined for each value. It can be concluded, then, that objective value expressions are explicit testable statements of utility. The site evaluation model is designed to make this type of objective utility statement.

Walmsley (1972) provides a good summation statement as to the role that utility concept assumes in the evaluation and decision making process: "No matter what clues are used to mitigate against uncertainty, a basic component in decision-making is utility, in the sense of the value placed on the alternative from which a choice is to be made . . . . Employment of the notion of utility rests on the idea that it is a subsuming variable and that, in geographical studies, locations can be ranked in terms of preference on the basis of the utility score." (p. 19)

The retail site evaluation model considers the problem of evaluation as a utility assignment problem. Numerous expressions of utility can be made about any particular retail site. Some of these utility expressions are those which are the subjective judgments of the evaluator; for example, a retailer may choose to locate at a certain site because he believes it is a "hot spot" for his type of activity. Other utility assignments are made on objective principles of site evaluation (some of these principles will be discussed in a later chapter). The model presented here is concerned with

the latter type of expression. The site evaluation model is an objective expression of utility in that it is based upon objective measurements of relative location variables, with those variables being analyzed and evaluated by objective mathematical procedures.

The expression of utility used in the model is that of the average monthly sales volume for a one-year period. The sales volume expression was chosen because of the availability of sales volume data, the ease with which sales volume can be defined, the common use in the literature of sales volume as a utility measurement, and the potential of the sales volume statement to be utilized as a surrogate measurement of numerous other types of utility statements. The evaluation model was developed with the idea that a reliable statement of the potential sales volume could be a satisfactory replacement for several other utility statements based on more limited principles.

However, it was not assumed that a sales volume statement would be the sole expression of a site's utility. In evaluating the total utility of a site, a firm would consider such factors as (1) the site acquisition cost; (2) how well the site integrates into the firm's total market; (3) operational costs such as the local public utility and labor rates; (4) the managerial requirements and difficulties resulting from the site's spatial position within the firm's total marketing region; (5) construction costs in terms of the physical characteristics of the site; and (6) local legal problems in

terms of zoning laws, building regulations, sign and building setback requirements, minimum wage laws, and store hour restrictions.

While the above are a few examples of other site utility expressions, other than sales volume, that a firm would obtain regarding the total place utility of a particular site, there are numerous additional statements which might be required depending on the retailing structure of the firm and the uncertainties of the firm's management. Nevertheless, the evaluation model was developed in the firm belief that a reliable potential sales volume statement would be the single most important utility measurement which could be made about any given retail site.

The Site Evaluation Problem and the Decision to Locate

The specific problem of "retail site evaluation" is often blurred within the context of the more general "retail location" decision process. This lack of distinction results when the researcher fails to identify the evaluation process with respect to the conditions under which site evaluation and locational decisions are made and also a conceptual framework which specifically relates the evaluation process to the total location decision process.

Conditions of the Retailing Environment

The location decision is only one subset of decisions in the complex set of retail decisions. This perspective was

recognized by Lloyd (1972) in his statement "The location decision is only one of the array of decisions that a firm has to make in its struggle to survive and grow under conditions of change. In most circumstances it is not the central concern of the business man even though as geographers we sometimes think it should be." (p. 146) Second, the interrelationships of various decisions need recognition; most location decisions are not made in isolation, but are often made in connection with investment, promotional, sales, personal, and other retail decisions. Finally, retail firms make decisions in the context of the retailing environment in which they operate.

Ryan (1967) hypothesized that a ". . . thorough knowledge of the firm's situation is basic to any attempt at the understanding of the goals and the process of decision-making within the firm." (p. 48) The firm's situation can be viewed with respect to two types of environments; a "real-objective retailing environment" and a "perceived-behavioral retailing environment." The former is the conditions of retailing as they actually exist, while the latter is the retail conditions as the decision-maker perceives them to be. In other words, the perceived-behavioral environment is only a very limited segment ". . . of the objective environment about which information signals are received and interpreted by the perception mechanism." (Lloyd, 1972, p. 138)

The fact that the decision maker's perception of his environment may vary ostensibly from the "real world situation" has caused several writers to comment on the role that the

perceived-behavioral environment has on the decision making process. Wolpert (1965) writes "Though the individual theoretically has access to a very broad environmental range of local, regional, national and international information coverage, typically only some rather limited portion of the environment is relevant and applicable for his decision behavior." (p. 163) Lloyd (1972), commenting on the same subject, states that "Only a limited proportion of the information transmitted by the objective environment is effectively received. It is this that determines the nature of the individual's behavioral environment, and it is this, and only this, that is relevant to purposive behavior." (p. 138) Finally, Ryan, in discussing the role of the behavioral environment, writes "The decision-maker's subjective interpretation of his situation is more significant for decision-making purposes than the situation as it actually exists." (p. 51) While it can be concluded that it is the perceived-behavioral environment that is important to the decision making process, the nature of that environment is determined by the real-objective environment and the perceptual mechanism of the firm.

The retailing activities of the real-objective environment are considered either controllable or uncontrollable (Table I). The controllable environment is those retailing strategies that the firm's management can control or influence to a considerable degree. They are generally listed as: (1) the goods and service mix, (2) the physical distribution mix, and (3) the communication mix. (Lazer, 1961, p. 37)

TABLE I

A Selected List of the Elements of the Real-Objective Retailing Environment

Controllable Elements

A. Goods and Service Mix

1. Parking
2. Sales
3. Service
4. Variety
5. Assortment
6. Price
7. Credit
8. Guarantees
9. Exchange
10. Alterations
11. Adjustments
12. Store Image
13. Delivery
14. Personal

B. Communication Mix

1. Personal Selling
2. Advertising
3. Internal Displays
4. Public Relations
5. Store Layout
6. Catalogs
7. Telephone Sales
8. Coupons

C. Physical Distribution Mix

1. Store Location (Site)
2. Distribution Centers
3. Warehousing
4. Transportation
5. Handling Goods
6. Parking
7. Inventory Levels
8. Inventory Controls

TABLE I

(Continued)

Uncontrollable Elements

A. Competition

1. Major Sources of Competition
2. Competitive Positions of Retailer's Resources
3. Inherent Advantages of Competitors
4. Competitor's Utilization of Elements of Demand Creation
5. Strength of Competitor's Resources
6. Consideration of Competitor Retaliation to Firm's Strategies
7. Number of Competitors
8. Location of Competitors

B. Consumer Demand

1. Demographic Characteristics
2. Sociopsychological Attitudes
3. Response to Various Promotions
4. Desired Sales Approaches
5. Emphasis Placed on Price
6. Concern for Brands
7. Degree of Brand Quality
8. Desired Product Attributes
9. Desired Quality
10. Desired Quantities
11. Customer Purchasing Habits
12. Spatial Behavior of Consumers

C. Relative Location

1. Areal Association
2. Accessibility
3. Areal Interaction
4. Areal Interrelationships

D. Legal and Social Restraints

1. Acquisition Regulations
2. Promotional Regulations
3. Tax Considerations
4. Zoning and Building Laws
5. Employment Rules and Regulations
6. Social Traditions and Practices
7. Social Values and Pressures

The conditions of the uncontrollable environment are those over which the firm's management has little or no control. The principal uncontrollables are: (1) competition, (2) consumer demand, (3) relative location, and (6) legal and social restraints.

The complexity of the environmental conditions of retailing can be grasped from Table I. Any decision on a particular element will require additional decisions on other elements. For example, a decision on an advertising campaign will require decisions concerning consumer demand elements of desired price, quality, quantity, and sales approaches. Likewise, a decision to locate requires decisions with regard to how well the site will integrate into the spatial characteristics of the present promotional campaign; how the new site correlates with the spatial shopping behavior of the area consumers, and what tax implications there are with regard to the new site. These two examples serve to illustrate the complex number of retail decisions and the complexity of the interrelationships between those decisions.

The second factor which determines the extent of the perceived behavioral environment and therefore the decision process is the perceptual mechanism of the firm. The firm is constantly receiving information regarding its performance in the real-objective environment. The interpretation of this information by the firm's perceptual mechanism will depend upon several receiver characteristics: (1) number of receivers, (2) cultural or group affiliation, (3) socio-economic status,

(4) personality-personal attributes, (5) age and experience, (6) education, and (7) aspirations. (Lloyd, 1972, p. 139)

The structure of the perceptual mechanism varies greatly from one firm to another. In many large firms there are specific departments, such as the marketing department, whose sole purpose is the gathering of relevant information by constantly monitoring the environment. The department usually has a formal set of policies and procedures with which to accomplish this purpose. Small firms, on the other hand, are characterized by less formal information systems; these systems usually consist of only an individual or small group of individuals whose means of obtaining information are more personal than scientific.

Five Retail Locational Decision Processes

Numerous writers (Hurst, 1972; Kotler, 1972; Lloyd and Dicken, 1971; Markin, 1972) have outlined steps to the decision making process. The following five processes are a composite of those outlines adjusted to the problem of the decision to locate. The five steps are: (1) the locational goal definition process, (2) the locational problem identification process, (3) the locational search process, (4) the locational evaluation process, and (5) the locational decision process.

The locational goal definition process. Locational goals are defined by the firm's management in order to minimize the uncertainty of locational problems, that is, to negotiate an environment of relative certainty with respect to the

evaluation and selection of sites. There is considerable variation in the number and type of goals which a firm develops and uses as guidelines in the evaluation and selection of site. Nevertheless, all firms, in defining locational goals, are subject to the following considerations and/or constraints: (1) the goods and service mix, (2) the physical distribution system, (3) the communications mix, (4) the size of the retail firm, (5) the size of the particular retail outlet, (6) the consumer demand patterns, (7) the consumer movement patterns, (8) the socio-economic profile of the potential consumer, (9) the structure of the trade areas, and (10) the nature and structure of the competition. The firm in its definition process must take into account each of the above considerations in the establishment of any particular locational goal. In addition, for each defined locational goal, the firm will attempt to identify an aspiration level or make a general statement as to their anticipated expectations.

The locational problem identification process. To identify a retail problem one must identify which retailing condition is producing locational pressure upon the firm. The retail environment provides a continuous source of stimuli to which the firm responds in its daily operations. However, when a strong negative feedback occurs indicating an undesirable imbalance between the firm and its environment, such an imbalance can be regarded as a stress. (Lloyd, 1972, p. 144) Stress is defined by Wolpert (1966) as ". . . any influence,

whether it arises from internal environment or the external environment, which interferes with the satisfaction of basic needs or which disturbs or threatens to disturb the stable equilibrium." (p. 92) The perception of environment elements as stressors and the response to stress situations will vary considerably from firm to firm. (Brown, 1970, p. 2) Whether or not a particular environmental element is perceived as a stressful situation will depend upon the intensity of that element and the strength and resources of the firm. As was stated above, retail firms continuously respond to environmental stresses as a normal part of daily operations, but when locational stress reaches or exceeds a certain intensity or critical level--the firm's "stress tolerance threshold"--the firm must react in such a manner that a deliberate locational decision is made concerning the nature of the problem. Once the problem has been identified, the firm can then begin the search process necessary for a satisfactory spatial solution.

The locational search process. The locational search process is the response to a spatial stress which has been defined as a locational problem. In other words, the search process is problem-directed in that it is directed toward finding an alternative location. Problematic search is distinguished from search for understanding because it is interested in understanding only insofar as such understanding contributes to the goal of finding a solution. (Cyert, 1963, p. 121) In summary, the locational search process consists

of establishing alternative solutions to defined locational problems which have arisen from spatial stress, and it is a motivated and biased behavioral response to that environmental stress.

The locational evaluation process. The locational evaluation process is primarily concerned with the examination and judgment of a set of locational alternatives. The process of evaluation usually entails four operational acts. They are the selection act, the measurement act, the analysis act, and the valuation act. The selection act is the selection of a general evaluation criterion and the variables which best represent that criterion. The measurement of the selected variables and the obtaining of reliable data concerning those variables constitute the measurement act. The analysis act is the analysis of the obtained data and the presentation of that data in an orderly fashion. In the valuation act, an assignment of a "value statement" or a "utility function" or a "payoff function" is the principal task. The valuation assignment for a particular alternative is usually in the form of a point along a preference scale. The four operational acts define how judgments are assigned to various alternatives and how this statement of meaning is expressed as a rank ordering of points along a preference scale.

However, several other characteristics of the evaluation process should be noted. First, alternatives are not simply evaluated once but, generally, they go through an

evaluation process several times. Each time there is often a different evaluation criteria, variables, methods of measurement, and analysis and value statements. This multiplicity of evaluation is often a screening process in order to limit the number of alternatives in the final decision process. Second, because the establishment of alternatives is a search process, "It is unusual for the decision maker to have a whole range of alternatives to evaluate simultaneously. Generally, alternatives are discovered sequentially and must therefore be evaluated singly or in groups of possibly two or three." (Lloyd, 1972, p. 157) Finally, alternative evaluation is often conducted as programmed behavior. A very real part of organizational behavior is the use of "programmed evaluations," "rules of thumb," and "in principle judgments." As Kolter (1967) writes: "Most executives want their decision making to be characterized by orderly process or analysis . . . . While they base a decision on organizational or personal considerations, they do want to know how to determine the right action in principle." (p. 176)

In sum, the process of evaluation consists of four operational acts which attempt to assign meaning to an alternative or set of alternatives. The process is characterized by multiplicity of evaluation, sequential evaluation, and programmed evaluation.

The locational decision process. The locational decision is the act of making a selection or choice from a set of

evaluated alternatives. The final selection will depend upon the following factors: (1) the number of acceptable alternatives, (2) the number of acceptable "value" or "utility" statements, (3) the number of decision making units, (4) the time allotted for the decision to be made, (5) the nature of the goals and aspirations, and (6) the consequence of not making a decision. In other words, the final selection of an alternative is based upon "how well" that alternative "utility" statement corresponds to the goals and aspiration levels prescribed by the firm.

In summary, this chapter has established several necessary perspectives and parameters of the site evaluation model. The model is

1. concerned with the large-scale problem of evaluating a particular point in space.
2. concerned with the businessman's problem of finding a reasonable location for a given activity--a self-service steak restaurant.
3. viewed from the perspective of a multi-unit firm.
4. concerned with the locational stress problem which leads a firm to add a new site as part of an expansion program.
5. concerned with evaluating any or all alternatives which may be presented to it by the firm's management.
6. concerned with site evaluation as a relative location problem.
7. concerned with site evaluation as a commonness problem.
8. concerned with site evaluation as a utility assignment problem.

9. cognizant of the fact that locational evaluations and decisions are a relatively unimportant part of a firm's daily operations.

10. cognizant of the fact that locational evaluations and decisions are not made in isolation but are made in connection with numerous types of retail decisions.

11. cognizant of the fact that site evaluations and decisions are not made on the basis of the firm's perception of the real world conditions and not necessarily on the conditions of the world as they actually exist.

12. concerned with only one of five processes in the retail locational decision process, that is, the evaluation process.

13. concerned with the examination and judgment of the meaningful location of a searched alternative or set of alternatives.

CHAPTER IV

Toward a Retail Site Evaluation Model: Some Principles of Retail Site Evaluation

A literature search produced numerous general principles of retail site evaluation and selection. While not all of these principles are appropriate to this research, those presented were selected because they make a specific contribution to theoretical considerations of the site evaluation model. Specifically, the selected principles represent the most conceptually sound principles from a relative location or relative environment viewpoint and from a real business world perspective. In addition, these principles can be operationalized by the use of surrogate variables and measurements. This discussion should not be considered a completely exhaustive presentation of site evaluation principles. Nor are the principles mutually exclusive of each other. Each site principle attempts to express the value of a site, in doing so, there is considerable overlap of ideas, concepts, and variables.

The concepts of relative location and relative space (environment) are inherently important components of each of the discussed principles of site evaluation. These principles attempt to define and evaluate a retail site on the basis of its position relative to some place or activity. While this

relative position is expressed in a variety of terms, it is, nevertheless, either the overt or covert basis for the principle. Literature examples of expressions which relate the relative positional quality of a site are: (1) a site's situation with respect to . . . , (2) the linkage between the site and . . . , (3) the relationship of the site to . . . , (4) the association of the site with . . . , (5) the site's interaction with . . . , and (6) the interchange between the site and . . . . The relative locational and environmental aspects of each of the principles will be discussed.

Principle of Generative Location

Nelson (1958) defines a generative location as one in which "the consumer is directly attracted from his place of residence; to shop here is the primary purpose of the consumer leaving his residence." (p. 45) The definition has two aspects. First, the business enterprise must be of such a nature that the consumer is willing to leave his place of residence specifically to acquire a given product offering. Specialty restaurants, specialty goods stores, discount houses, and supermarkets are all examples of generative businesses which have been cited in the literature. The second aspect of the definition is that the location of the store is such that the customer is willing to overcome the frictional effects of the movement (as measured by miles, time, or cost) between his residence and the store location. Essentially, this principle expresses the idea that in the site evaluation

process for a generative business, the evaluator must consider the positional qualities of the site relative to residential areas. Depending on the nature of the generative business, this relative position could be represented by some measurement of the intensity of residential land-use in the vicinity of the proposed site, for example, the total number of residential units within a two-mile radius; the effort required to reach the site from surrounding residential areas, for example, the driving time from the center of each residential district to the site; or the quality of the surrounding residential district, for example, the mean assessed value of the surrounding residential units.

In summary, the goal of the evaluator with respect to this principle of generative location could be stated as to determine the spatial convenience or efficiency of a proposed site with respect to residential areas.

Principle of Suscipient Location

A suscipient location is one in which ". . . the consumer is impulsively or coincidentally attracted while away from his place of residence for any primary purpose other than shopping." (Nelson, 1958, p. 45) Suscipient locations are business receivers rather than business generators in that they service people who are on trips which can be described as work, business, or pleasure. Examples of suscipient locations are a florist shop in an airport, a restaurant near an office complex or adjacent to a highway, a drugstore near a

hospital, and a bar adjacent to a factory or ballpark. Each of the above examples expresses retail location in terms of its relative position with respect to some other activity.

It is the relative environment of the site that must be the principal concern of the evaluator. Taking into consideration the type of suscipient business, the evaluator makes his judgment as to the site's worth on the basis of the site's ability to interact with locations containing nonshopping generative activities. As in the case of generative location, measurements of intensity, effort, and quality are used in evaluating the environment for a suscipient business in a suscipient location. The evaluator's goal for suscipient locations is to ascertain whether or not a site is spatially convenient and efficient in its association with generative activities.

Principle of Interception

The principle of interception has two distinct elements. First, a source region or customer origin, a region from which consumers are drawn. Second, a terminal region or customer destination, a region to which consumers are drawn. Examples of source regions include residential areas, office complexes, and industrial plants. The central business district, large shopping goods clusters, and the dominant store within a shopping center are all examples of terminal or destination. (Gist, 1968) Any point between these two regional types can be considered a point of interception. The evaluator has both

an identification problem and an evaluation problem. The identification problem consists of determining: (1) the location of source and terminal regions, (2) the lines of connectivity between those regions, and (3) appropriate points (sites) along the connection line. The evaluation problem is one of measuring the magnitude or quality of these regions, lines, and points. In the relative location sense, the evaluator's problem is one of determining whether or not a site is an efficient intervening opportunity between known consumer source and terminal regions.

A different perspective of the interception principle is often expressed as the "concept of locational vulnerability." In this case, the evaluator's job is one of determining the source of a competitor's business and attempting to find a location which is capable of intercepting his customer flowage. If such a location exists, the firm's competitor is vulnerable in a locational sense, at least he is vulnerable with respect to one or more source regions.

There is considerable difficulty in measuring the interceptor qualities of a site. The difficulty arises from the fact that there are numerous source and terminal regions, lines of connectivity, and points (sites) along these lines of movement. Traffic volume is often used as a surrogate measurement of interception. It is generally assumed that the selection of a site on a traffic artery with high volume will serve as a point of interception.

Principles of Cumulative Attraction and Store Attraction

The principles of cumulative attraction and store association are both used on the premise that a cluster of retailing activities will have greater drawing power than retailing activities which are dispersed. Nelson's (1958) principle of cumulative attraction states that "A given number of stores dealing in the same merchandise will do more business if they are located adjacent or in proximity to each other than if they are widely scattered." (p. 58) Both retail location literature and urban structure literature make reference to the cumulative attraction effect of the familiar "rows," "cities," and "allies." For example, in most large cities there are "automobile rows," "mobile home cities," and "restaurant allies."

The principle of store association as developed by Applebaum and Cohen (1961) implies that "When a site is occupied by a combination of stores, the trading area of each store will be affected by the trading area of its neighbors." (p. 21) The theoretical effect of this association is that the outermost boundary of the largest store is also the outermost boundary of all stores in the cluster. However, Applebaum and Cohen point out, "The per cent of business that many stores obtain from the outermost portion of a retail district's trading area tends to be only slightly greater than if these stores were freestanding." (p. 21) Nevertheless, the

potential number of consumers for a cluster of stores is substantially greater than for dispersed retail operations providing the stores are compatible. For example, if a retailer locates a shoe store within a regional shopping center, theoretically, his trade area would be equal to that of the lead store.

The evaluator's problem in this case is to determine whether or not a site has the potential to benefit from the cumulative drawing power of its relative environment. In the case of the principle of cumulative attraction, that relative environment consists of "like" establishments. The relative environment suggested in the principle of store association consists of any retailing activity which would extend the size of the site's trading area.

This general drawing power principle could be extended. The association of a site with any type of economic activity which would tend to attract potential consumers to the site's vicinity could be beneficial. Office buildings, medical complexes, factories, recreational and entertainment facilities, and governmental operations all tend to increase the potential consumption within the area in which they are found. Essentially, this extension of the association principle expresses the same location advantage as was described by the principle of suscipient location. Sites which are situated within areas having a great variety and intensity of landuse enjoy the advantages of a potentially higher degree of interaction. In summary, the evaluator's goal with respect to the above

principles is simply to select sites which have environmental associations that tend to increase the potential number of consumers.

Principle of Compatibility

The principle of compatibility is very similar to the principles of cumulative attraction and store association. In the principle of compatibility the emphasis is on the interchange between two compatible businesses.[1] Nelson (1958) puts it this way: "Two compatible businesses located in close proximity will show an increase in business volume directly proportionate to the incidence of total customer interchange between them, inversely proportionate to the ratio of the business volume of the larger store to that of the smaller store, and, directly proportionate to the sum of the ratio of purposeful purchasing to total purchasing in each of the two stores." (p. 66) The grouping of lead department stores with retailers such as clothing, shoe, and jewelry stores in a regional shopping center is often cited as an example of compatible businesses which have concentrated in a limited area for the maximization of customer interchange.[2]

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[1]Compatible businesses are any two or more establishments which can exist in the same area without discord or disharmony.

[2]For an index of retail compatibility see R. L. Nelson's The Selection of Retail Locations. 1958, Chapter 8.

Principle of Store Saturation

There is a point at which the principle of cumulative attraction ends and the principle of store saturation begins. The determination of whether or not existing store facilities are efficiently used and whether or not they meet the consumer's needs adequately constitutes the evaluator's problem of store saturation. Applebaum and Cohen (1962) state that "Saturation exists for a given type of store when a market has just enough store facilities of a given type to serve the population of the market satisfactorily and yield a fair return to the owners on their investments without raising prices to the customer to achieve this return." (p. 35) In evaluating a site, the analyst must avoid retailing environments which are "overstored" and seek out areas which are "understored." The relative location with respect to the store land-use intensity is of vital concern to the evaluator.

A second aspect of store saturation is that of congestion. Areas which become saturated with stores and other activities tend to become less attractive due to the limited mobility within those areas. The central business district of most large urban areas can be cited as an example. The avoidance of sites in congested areas is an important factor for many retailing activities which are generally reached by automobile. There is a point where the volume of vehicle and foot traffic becomes a limiting factor in the quest for higher sales volume.

Principle of Customer Threshold

There is a minimum number of potential customers which is necessary to support a particular retail activity at a given site. The required customer magnitude is measured by many different variables. Variables commonly used are the total population; the percentages of population with certain characteristics, for example, a mean annual income greater than $10,000; the number of business units; the number of particular types of business units, for example, the number of shopping goods stores; the total sales volume of a given area; and the daily traffic volume. By using a customer magnitude measurement, the evaluator determines the potential sales volume for both the proposed site and its relative environment. In other words, a site's worth is based upon the customer magnitude of a defined area. If that magnitude exceeds the firm's minimum threshold, it is considered for occupancy.

Principles of Accessibility

Accessibility factors are numerous. Each factor attempts to define in some limited fashion the problems concerned with the ease of identifying, reaching, approaching, and entering a site. The number of considerations in evaluating the total accessibility of a site is extremely complex. The problems of site identification deal with the customers' ease of visually identifying the location. Identification

considerations are: (1) the width of the site, (2) the number of streets the site fronts on, (3) the physical terrain, (4) the size of the site, (5) the side of the street the site is located on, and (6) the location within the street block. Considerations affecting the reaching and approaching of a site are the number of intersections, the width of the streets (number of lanes), the presence or absence of public transportation, and the amount of traffic congestion. Finally, factors influencing the ease of entrance are the number of entrances, the width of entrances, the speed limit, and the presence or absence of a traffic meridian. The accessibility problem can be summarized as one of determining the ease of interchange between a site and the potential consumers within its relative environment.

Site Evaluation Principles and the Site Evaluation Model

To determine the value of a site is the primary problem and/or goal of each of the site evaluation principles discussed above. While each of the principles expresses the site value in a different manner, they all have three important methodological and conceptual similarities. First, the variables which are used to express the value of a site are relative location variables, in the sense that they express the positional qualities and relationships of a site to any number of different criteria. Second, the measurements which are used to determine the value of a site are relative locational

measurements, in the sense that they measure the positional qualities and relationships of a site to any number of different criteria. Third, the variables and measurements used to determine and express the value of a site are meaningful only with respect to that site's relative environment.

The responsibility of the evaluator is also similar in each of the above cases. First, he identifies the principles which he feels best describe the value of the site. Second, he determines the relative environment which is appropriate to the principle. Third, he selects the variables which best represent the principles. Fourth, he selects measurements which best describe the variables and which will give him a clear expression of the site's value. Finally, the data are collected and a value is assigned to the site.

The site evaluation problem as expressed in the preceding principles is essentially a problem of analyzing a site's relationship with its relative environment. It is this relationship that allows the evaluator to estimate the value of a site.

The variables and measurements of the retail site evaluation model developed in this research were selected and used as surrogate expressions of the site's relationship with its relative environment. The model itself is based on the premise that a site's relationship with its relative environment determines the degree of success that a retailer may expect. In addition, the model contends that through the analysis of the site, its relative environment, and the

relationships between the site and its environment (relative location), reliable estimates can be made as to the site's potential value to the retailer.

The site evaluation principles and the site evaluation model can be described as environmental or ecological. This description is appropriate if one accepts the definition of ecology as the interrelationships of organisms (sites) and their environments. On the other hand, if one chooses to define ecology as the totality of relationships between organisms and their environments, the ecological description is not appropriate. For neither the model nor the principles claims to examine the totality of relationships between a site and its environment. The site evaluation model is concerned only with the relative environment of a site. Relative environment will be defined precisely in Chapter V. For the present, it can be defined as that area surrounding a site from which the site receives a substantial share of its support.

Five summation statements can be made concerning the retail site evaluation model and its relationship to the principles of site evaluation.

1. The model is an ecological model in the limited sense that it is a relative environmental model.
2. The model is based on the premise that site-environmental relationships determine the value of a particular location.

3. The site-environmental relationships utilized in the model are based on several principles of site evaluation as described in the literature.
4. The model is based on the premise that there are surrogate variables and measurements which can be obtained that express the site-environmental relationships.
5. The model is based on the premise that these relative location variables and measurements can be analyzed to obtain an expression or estimation of the site's potential value to the retailer.

CHAPTER V

The Retail Site Evaluation Model

The basic theoretical principles and parameters of the site evaluation model have already been established in the preceding chapter. The major purpose of this chapter is to operationalize the model with respect to those principles and parameters. The procedures discussed here are directed toward developing an operational model which is capable of answering the research question, that is, can relative location variables be used to estimate the potential sales volume of alternative retail sites? Stated differently, can the relative position of a site within its relative trade area be used to estimate the sales volume potential of alternative retail sites?

The ultimate goal of the site evaluation model is to be able to determine one measurement of a site's place utility in terms of its potential sales volume. The model's place utility statement will provide the firm's management with one additional objective tool in the selection of retail site alternatives. In addition, the model will be operational in the sense that a prescribed set of procedures are enumerated in such a manner that the model is applicable not only to the case study firm but also to any other "like" retail operation

which has both a convenience and shopper goods element. With a limited number of adjustments, the model can be appropriate to any number of different convenience goods and shopper goods firms.

The site evaluation model does not attempt to assign a level of aspiration as to what sites are acceptable or what sites are unacceptable. The model simply makes statements as to a site's potential sales volume. The firm is free to decide if any or all the evaluated site alternatives are above or below an aspiration level that is appropriate to the firm. Finally, the model is concerned with expressing a site's present place utility, and it does not assume to predict the place utility of that site in some future time period.

The model of site evaluation consists of four operational steps. They are (1) the selection act, (2) the measurement act, (3) the analysis act, and (4) the evaluation act.

The Selection Act

The first step in making the site evaluation model operational is the selection act. The selection act consists of three decisions. First, the evaluator decides on the theoretical principles which are appropriate to the type of retail activity. Second, the evaluator decides on the operational parameters of the model. For example, the sampling area from which variable measurements are obtained. Finally, the evaluator selects variables which best represent the evaluation principles and which are consistent with the

operational parameters. The purpose of the selection act is to define clearly the model's principles, parameters, and variables.

The Model's Evaluation Principles

The preceding chapter has already established the basic site evaluation principles which are relevant to the model. The purpose of this discussion is to relate those principles to the particular type of retailing activity which is the focus of this study. For this particular study the type of retail operation is described as a prepared food or restaurant business. More specifically, the case study firm is a regional chain of self-service steakhouses.

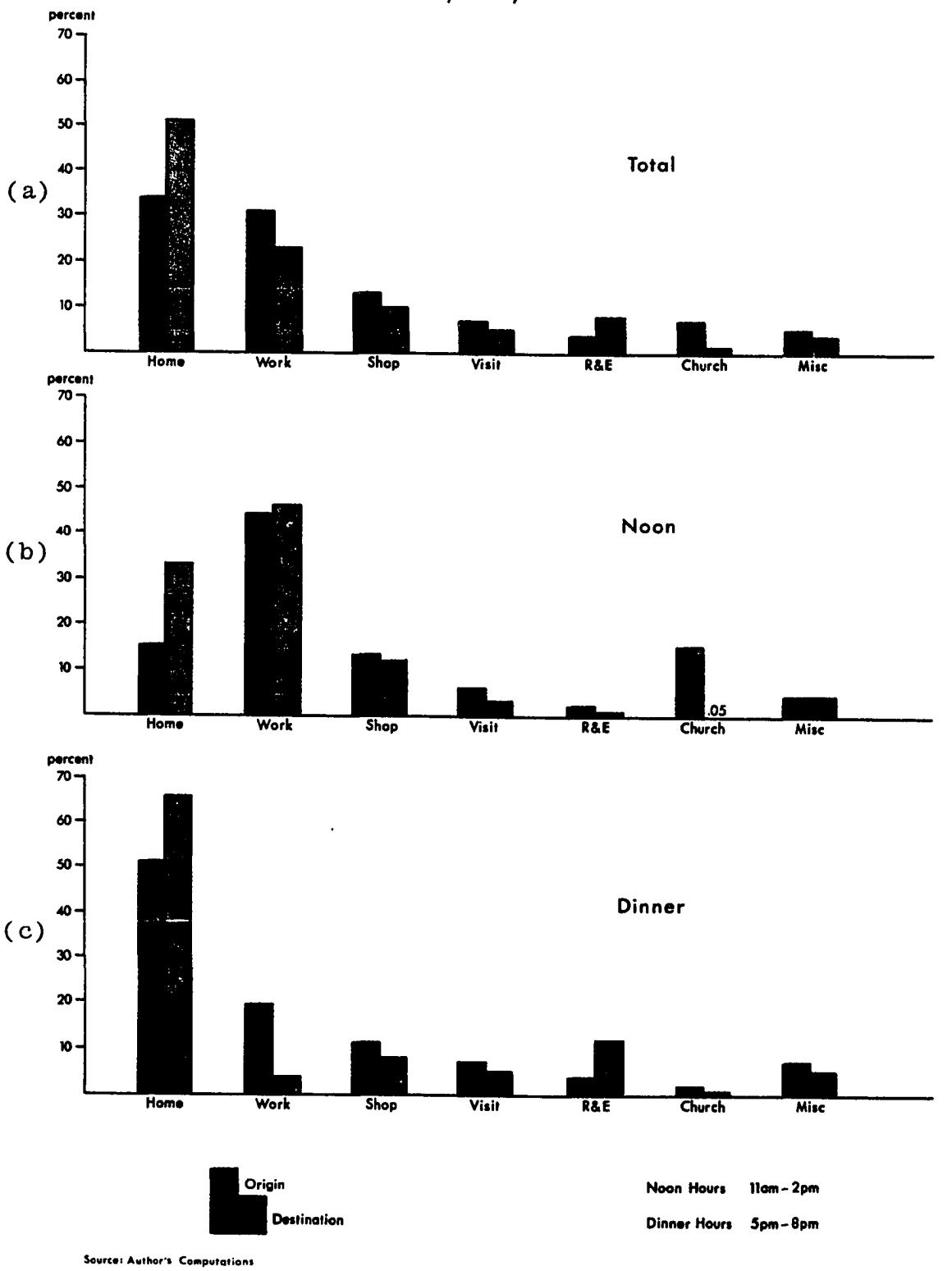
The set of principles which should be used in evaluating sites for restaurants is not unique. For the most part, they are the same principles which should be used in the site evaluation of any retail operation. However, restaurants have several characteristics that should be considered in the selection of evaluation principles. First, there is considerable variation in the type of customer origin and destination (Figure 1a). While place of residence and place of employment are the principal origins and destinations, other origin and destination types (shopping, visiting, recreation-entertainment, church, and miscellaneous) are all substantial enough to influence the selection of the evaluation criterion. Second, there is a noticeable difference in the origin and destination characteristics between the noon hour and the

dinner hour (Figures 1b and 1c). Place of employment is both the principal origin and destination of the noon hour customers. Place of residence assumes prominence during the dinner hour period. Third, most restaurants have characteristics of both a convenience goods and shopping goods firm. While restaurants are generally classified as convenience goods establishments, comparison of menu, price, quality, quantity, and service are all important factors in the consumer's selection of eating establishments. Fourth, the customer is often under time restraints in his purchase and consumption of prepared foods. This is particularly true of breakfast and lunch consumers. Fifth, restaurants are both generative and suscipient businesses in that they tend to be generators, as well as receivers, of customers. Finally, restaurants are reasonably compatible with a wide range of activities. Nelson's (1958, Ch. 8) tables of compatibility show eating establishments as being "highly," "moderately," or "slightly" compatible with just about all types of retail and service activities. All of the above characteristics have important implications in the selection of site evaluation principles. The following discussion related those implications to the principles which were selected for use in the site evaluation model.

Principles of generative and suscipient location. These principles were selected because (1) restaurants are generative businesses to which the customer is directly

FIGURE 1

Origin and Destination of Customers
Total, Noon, Dinner



Source: Author's Computations

attracted from his place of residence (Figure 1a), therefore, the site evaluation process must consider the relationships a site has with residential areas; and (2) restaurants are suscipient businesses to which the customer is coincidentally attracted while at work, visiting, seeking professional advice, or seeking recreation and entertainment (Figure 1a); therefore, the site evaluation process must consider the relationships a site has with offices, factories, retail stores, theaters, ballparks, and so forth. In summary, the varied origin and destination characteristics of the prepared food consumer is such that the evaluation process must account for the numerous interrelationships a site has with both residential and non-residential land-use areas.

Principle of interception. The principle of interception was selected because it specifically recognizes the need to select sites which will be a convenient interceptor or intervening opportunity between numerous customer origin and destination types. Due to the convenience goods nature of the prepared food industry, the site selection process should consider the convenience of the consumer by giving him a readily accessible intervening opportunity in his origin-destination movements. In other words, this principle was selected because it represents in an indirect manner the convenience goods aspects of the restaurant industry.

Principle of cumulative attraction. In a general sense the principle of cumulative attraction represents the shopping

goods aspect of the restaurant industry. Prepared food consumers are generally attracted to areas (streets) which contain numerous eating establishments. Once the customer is in the area, he tends to shop in terms of menu, price, and quality. However, the total cumulative effect of restaurant agglomeration is to increase sales volume of most units in the cluster; therefore, it should be considered in the site evaluation process.

Principle of store association. The selection of the store association principle was based on the need of the evaluation process to consider those environmental associations which would aid in the balancing and maximizing of the breakfast, noon, and dinner hour trade areas. In the prepared food industry the dinner hour trade is primarily consumers whose origin and destination is their place of residence (Figure 1c). On the other hand, the luncheon trade is largely dependent on consumers whose origins and destinations can be described as shopping, working, visiting, and other activities (Figure 1b). To maximize this period and to create a balance between it and the dinner hour, a site needs store associations and any other type of economic activity which would tend to draw potential customers into the area. Whether that potential customer is attracted for purposes of shopping, employment, visiting, or entertainment is incidental.

Principle of compatibility. Restaurants are compatible with a great variety of other activities. Nelson (1958) found,

however, that eating establishments are more compatible to shopping goods establishments. (p. 75) Therefore, in the site evaluation process the relationship of a site to shopping goods establishments should be noted. The degree of site success should be, in part, a function of the intensity of shopping goods units.

Principle of store saturation. The principle of saturation was included for two reasons. First, restaurants are influenced both positively (cumulative attraction) and negatively (saturation) by competition. In evaluating sites for restaurants, it must be determined whether or not a site will be negatively or positively affected by competition. Second, because of the convenience nature of restaurants, some measure of the potential traffic congestion needs to be determined. A total land-use intensity needs to be obtained. This land-use intensity factor could be either beneficial in terms of potential site-environment interaction or it could be harmful in terms of saturation-congestion.

Principle of customer threshold. The selection of the customer threshold principle was necessary because a restaurant, like any other business, needs a minimum potential consumer base in order to operate. Therefore, the process of site evaluation must contain procedures to obtain a measure of customer magnitude.

Principles of accessibility. Restaurants as convenience goods operations need exposure and easy access. Evaluation of

the ease of interaction between the site and its environment is a necessary part of the model.

The principles used in the site evaluation model are not the only ones which could be used in regard to the restaurant industry. The principles which are employed represent those most relevant to the industry. Inclusion of additional principles would tend to clutter the model and create a greater degree of overlap than already exists. Once the principles have been selected and justified, the next step in the selection act is to decide on representations of this principle.

The Model's Operational Parameters

The model's operational parameters rest on two fundamental concepts. They are the concept of relative location, and the concept of relative environment (space). The previous chapter has already established the importance of both of these concepts in the evaluation process. Therefore, the principal concern of this discussion is to define these concepts in operational terms. There are any number of possible operational definitions for each of these concepts, depending on the various facets of the firm's retailing activity. The operational definitions of relative location and relative environment used in this study were developed with regard to the requirements of the case study firm. It is recognized that given a different firm the definition would require the appropriate adjustments. To operationalize the concept of relative

location the evaluator must first define the concept of relative environment (space).

The total trade area should probably be considered the site's relative environment in that it represents the sum total of all the site's relationships, linkages, and interactions. Unfortunately, the cost and time of obtaining the necessary information concerning these relationships, linkages, and interactions for the entire trade area would, in most cases, be prohibitive, hence the need for limiting the study area to a primary trading area. The primary trading area is that limited segment of the total trade area for which information concerning the site's relationships, linkages, and interactions can be obtained up to the point where the cost of obtaining additional information exceeds the value of that information to the firm's evaluators.

The primary trading area is operationally delineated by calculating the "total value of information" (T.V.I.) for various distance classes. The distance classes are defined as one, two, three, four and greater than five mile radius around each site. The total value of information for each distance class is given by:

$$T.V.I.^{1} = \frac{\text{Weighted Value of Distance Class}}{(\text{Total Area}) \quad (\text{Unit Cost})}$$

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[1]For example, if the weighted value of the first mile radius is 21.9, with a total area of 3.1416 miles and a constant unit cost of collecting information of 1; the total value of information would be:

$$T.V.I. = \frac{21.9}{(3.1416) \quad (1)} = 6.97$$

where: Weighted Value of Distance Class is the intensity of customer-site relationships, linkages, and interactions for each distance class; expressed as a cumulative percentage of the total-customer site relationships, linkages, and interactions. The variables used to determine the intensity of customer-site relationships are: (1) the customer's place of residence, (2) the customer's place of employment, (3) the customer's immediate point of origin, (4) the customer's intended point of destination, and (5) the customer's nearest relationship, either origin or destination.

Total Area is the square of the diameter of each distance class multiplied by the constant .7854.

Unit Cost is the constant cost for obtaining measurements of relative location variables per city block.

The acceptable total value of information and therefore the operational primary trading area will depend upon the firm's internal resources and the differential in the value of information from one distance class to another. In the final analysis, the firm's management will make a subjective judgment as to how much they are willing to invest for a given return of information.

Once the mean primary trading area has been identified, the evaluator can then define the relative location of any present or potential site. The relative location of any particular site is that site's position with respect to all other sites within the defined relative trade area. That position can be identified by relative location variables which best represent the relationships, linkages, and interactions between those sites.

The Model's Relative Location Variables

The third step in the selection act is to identify those surrogate variables which will adequately represent the

site evaluation principles. The problem is to select those variables which will contribute the most in identifying the relative potential of a site and which can be measured with the minimum of cost and effort. The model recognizes two major sources of variables; those which have been enumerated in the literature and those which can be discovered through the analysis of the primary trading area.

Site evaluation variables have been enumerated in many different studies. To cite one example, B. J. Epstein (1970) suggests four general categories of site variables; they are physical, psychological, legal, and economic.[2] Physical site location variables are those which describe the natural attributes of a particular site. Such physical features as the size (square footage) and shape of the lot, the relief structure (degree of slope), and the surface and sub-surface materials, all integrate to create the natural backdrop for any given site. In addition, the current land-use character as well as the presence of service utilities provides the analyst with additional evaluation criteria. Finally, as stated by Epstein, (1970) ". . . perhaps the single most important physical site attribute is direct accessibility . . . visibility and accessibility are independent characteristics but cannot be treated separately." (p. 193) This accessibility factor can be determined by several variables--the general structure

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[2]While this classification is not totally applicable to this study, a general discussion of Epstein's typology will familarize the reader with one possible source of relative location variables.

of the transportation network, the number of intersections, amount of street frontage, block position, general geographic position within the city, and physical barriers to movement.

Variables which are psychological in nature are those which influence the customer's perception of a site. These factors can be thought of as the "perceptual location," that is, the customer's perception of the site relative to the customer's perception of the total retailing environment. Three general variable types are used to describe this perceptual location--competition, retail association, and area association. Competition is viewed as the number of perceived intervening opportunities between the customer and the site. It is often represented by the number of "like" competitors within the immediate vicinity. Retail association is a measure of the type and intensity of retailing operations within the immediate area. Area association is the general psychological impression of the broader area land-use pattern. The last variable is an attempt at measuring the vague concept of "the right side of town." More precisely, it is an attempt to measure the general social and business status of the area.

Laws which regulate land use and the conduct of business are the principle legal factors. Zoning and building regulations can represent strong obstacles and/or protection to business enterprises. Setback requirements of both building and signs are variables which are considered as either a positive or negative factor in determining accessibility and visibility. Store-hour restrictions are seen as variables

which could limit the retailer's potential sales volume. While the direct measurement of all these variables is impossible, it is possible to develop surrogate variables in some cases.

The last general category of variables are termed economic. Essentially, economic variables are those which measure either the number of potential consumers available to a site or the cost of occupying a site. Traffic counts and total population (numerous population characteristics such as median family income are often used in place of total population) are variables commonly used in an attempt at estimating the value of a particular site. Public utility rates, insurance costs, rent costs, and taxes provide readily available measures of occupancy costs.

The purpose of the above discussion was not to identify the research variables, but to establish one possible source of such variables. A literature search should be the first step in selecting variables which are capable of measuring a site's relative location and the relationships, linkages, and interactions associated with that measurement.

The second step in identifying variables is an origin/destination study of the firm's consumers. The study should meet the requirements of a representative sample and its principal concerns would be to determine (1) the distribution of total customers by origin type, (2) the distribution of origins of all customers by distance zones, (3) the distribution of total customers by destination type, and (4) the distribution of destinations of all customers by distance zones.

The origin/destination study will reveal information concerning the type and relative importance of the relationships, linkages, and interactions which characterize the firm's operations. Once the type and the importance have been determined, the evaluator can then select variables which will best represent those linkages and interactions.

In establishing the relative location variables to be used in the retail site evaluation model, both a literature search and an origin/destination study were utilized. The model incorporates three general categories of relative location variables. They are (1) residential relationships, linkages, and interactions, (2) commercial relationships, linkages, and interactions, and (3) accessibility/traffic flow relationships, linkages, and interactions. To avoid duplication, the exact specification of the variables included in the above categories will be cited in the next operational step of the site evaluation model--the measurement act.

The Measurement Act

The second operational act is the measurement of the selected relative location variables and the obtaining of reliable data concerning those variables. Several different types of measurements and methods of data collection were tested and considered before the final selection was made. The final decision concerning measurement type and data collection was made with regard to the case study firm.

Data Measurement

Nine variables and their respective measurements are used in the site evaluation model. The type and number of variables and measurements which are used were selected in accordance with the following criteria: (1) Are they a good surrogate expression of one or more of the site evaluation principles? (2) The requirements of the statistical models used in the analysis act, and (3) The ease and cost of collecting the data.

The total number of residential units within the relative trade area. The total number of residential units includes the number of single-dwelling units, the number of multiple-dwelling units, and the number of transient-dwelling units. This variable and measurement was selected as a surrogate measurement of the principal of generative location in that it is one measurement of the relationship that a site has to residential areas. In addition, it is a measurement of the potential source-origin and terminal-destination factors which is an important component of the principle of interception. Finally, the number of residential units represents, in part, the intensity of land use and the potential number of consumers within the primary trading area.

The total number of intersections within the relative trade area. The total number of intersections includes both three-way and four-way intersections. Its inclusion was

primarily for the purpose of gaining a surrogate expression of the ease of interaction between the site and its environment. In other words, the ease of reaching the site--the accessibility principle.

Front footage. Front footage is defined as the number of feet fronting on the principal transportation artery. While the number of intersections measures the physical ease of reaching a site, front footage measures the lot's accessibility in terms of visibility--the ease of identifying the site. Visibility is extremely important to the convenience aspect of restaurants.

Traffic volume. Traffic volume is defined by the total number of vehicles passing the site on the principal traffic artery in a twenty-four-hour period. Traffic volume is the most versatile of the variables selected. Indirectly, traffic volume represents (1) the intensity of interaction between customer origins and destinations, (2) the potential of a site as to its interceptor qualities, (3) a measure of a possible barrier to site-environment interaction--congestion, and (4) a measure of the consumer potential of the site.

Total number of convenience goods units within the relative trade area. Convenience goods ". . . are those goods for which the probable gain from making price and quality comparisons among alternative sellers is thought to be small relative to the consumer's appraisal of the searching costs

in terms of time, money, and effort." (Holton, 1958, p. 53)[3] The principle of store association is represented by this variable in that it is a measure of an economic activity which tends to draw potential consumers into the site's primary trading area. In addition, the number of convenience units is, in part, a measure of the land-use intensity.

Total number of shopping goods units within the relative trade area. Shopping goods are ". . . those goods for which the probable gain from making price and quality comparisons among alternative sellers is thought to be large relative to the consumer's appraisal of the searching costs in terms of time, money, and effort." (Holton, 1958, p. 53) Number of shopping units was included as a measure of compatibility. As in the case of convenience goods units, it is a measure of store association and land-use intensity.

Total number of service units within the relative trade area. Service units include all types of commercial, recreational, governmental, and personal activities. Essentially, for the purposes of this study, any activity unit not included in the convenience and shopping goods retail measurements, was considered as a service unit. The inclusion of service units serves as a measure of land-use intensity, store association, and customer threshold principle.

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[3]The classification scheme used in this research was adopted with modifications from Nelson, (1958, Ch. 8).

Total number of sandwich units in the relative trade area. A sandwich unit is an eating establishment whose menu selection consists primarily of sandwiches. The sandwich unit variable is included as an expression of the principle of cumulative attraction.

Total number of non-sandwich units in the relative trade area. Any eating establishment whose menu selection is primarily composed of entries which are something other than sandwiches is considered a non-sandwich unit. The principle of cumulative attraction is also measured by this variable. The distinction between sandwich and non-sandwich units was made because it was felt that non-sandwich units have a larger shopping goods aspect to them (sandwich units are more of a convenience goods operation) and would tend to have a greater cumulative attraction power than sandwich units.

These nine variables and their measurements represent adequately the site evaluation principles which constitute the theoretical basis of this model. In addition, they are readily attainable and they meet the restraints imposed by the statistical procedures in the analysis act.

Data Collection

Obtaining reliable measurements of location variables is the second step in the measurement act. There are several methods and/or sources of information which can be utilized in gathering the data. They are: (1) air photographs,

(2) street maps and topographic maps, (3) field survey, and (4) traffic counts.

Air photographs. Air photographs of the site's primary trading area should be obtained at the largest possible scale. (A scale of one inch to four hundred feet was found to be quite adequate in the case study.) These photos are used primarily to identify the presence of building structures, new construction, vacant areas and transportation network. In other words, air photographs are used to determine the land-use pattern of the site's primary trading areas. (They could also be used to measure the size of the structure.) Probably the single, most important function of these photos is that they not only give the evaluator a visual picture of the site, but they also aid in developing a mental map of the relative position of the site within its primary trading area.

Street maps and topographic maps. Both street and topographic maps can be used to gain additional land-use information obtained from the air photographs. In addition, the maps can be used for base maps for collecting data.

Field survey. A field survey is required to check the accuracy of the information obtained by the methods above and to specify the exact type of activity being conducted at the various sites within the relative trade area. Essentially, the field survey is the process by which the evaluator's mental map is transformed into an operational data map.

Traffic count. A traffic count is required to determine the daily traffic volume. In most cases, traffic counts have been made by the city's traffic department or the state's highway department. In cases where there is no available traffic count, one must be made according to representative sampling procedures. When available traffic counts are not comparable in time, adjustments should be made.

The four methods and/or sources of information cited above are sufficient in providing the information regarding the variables listed previously. While other methods and sources are available, these four were selected because they are applicable in all evaluation situations. While their degree of involvement within the evaluation process may vary from city to city and trade area to trade area, this measurement process is flexible enough to allow for those variations. In addition, these measurement devices and sources of information do not require additional "outside" or "specialized" help; the average firm is capable of using each of them.

The Analysis Act

The third operational act in the retail site evaluation model is the analysis of obtained data for the nine locational variables. This multivariate analysis consists of two problems: (1) an analysis of the interdependence of the relative location variables, and (2) an analysis of the dependence of sales volume on the relative location variables. The site evaluation model incorporates two statistical models; first,

a principal components factor analysis model to handle the first problem, and second, a multiple stepwise regression model to deal with the latter problem.

Analysis of Interdependence: Principal Component Factor Analysis

Factor analysis is a general scientific method for analyzing data. The literature on factor analysis has set forth numerous definitions (Aaker, 1971; Frank, Kuehn, and Massey, 1962; Harbaugh and Merriam, 1968; Holzinger and Harmon, 1941; and Spencer, 1966). In this research, factor analysis is used to discern the relationships between the relative location variables; therefore, an R-mode analysis was conducted.

The retail site evaluation model utilizes principal component factor analysis to accomplish several goals. First, factor analysis is used to determine the interdependency of the variables and to delineate the tangled linear relationships into separate patterns. "Each pattern will appear as a factor delineating a distinct cluster of interrelated data." (Rummel, 1967, p. 448) One of the research concerns is to determine, from the nine relative location variables, the important site dimensions in a successful retail operation; "Factor analysis does not accept arbitrary choices as to what are the important variables in any field. Nor is it satisfied, as is analysis of variance, simply to answer yes or no to the question of whether a change on one variable is associated with a change

in another. It goes further, both to determine the degree of the association and to pick out the essential wholes among the influences at work." (Cattell, 1952, p. 10-11) Essentially, the first goal is to establish "factors" or "dimension" which can be used in the analysis of dependency--the multiple stepwise regression model. While the exact interpretation of these factors is not a prerequisite for use in the dependency portion of the analysis, the factors will be rotated in an orthogonal fashion in order to increase the interpretability. A more exacting interpretation would be useful in the explanation of the sales volume estimates of the site alternatives.

The second goal is highly related to the first, the goal is parsimony or data reduction. Due to the limited number of cases (15) in the study, a reduction in the number of variables is necessary in order to meet the requirements of the regression analysis. While there is no absolute rule as to the number of cases to independent variables, the generally accepted rule is a minimum ratio of three to one.

Scaling is the third goal for which analysis is employed. Once the factors or dimensions have been determined, site alternatives can be scaled as to their involvement in the various factors. The degree of involvement of a particular site in a particular factor is expressed as factor scores. This involvement of sites with respect to factors will be a useful tool in explaining why certain sites are more successful than others.

The fourth goal of the factor analysis is data transformation. Factor analysis can transform data to meet the

assumptions of other techniques. For instance, application of the multiple regression technique assumes (if tests of significance are to be applied to the regression coefficients) that predictors--the so-called independent variables--are statistically unrelated. If the predictor variables are correlated in violation of the assumption, factor analysis can be employed to reduce them to a smaller set of uncorrelated factor scores. The scores may be used in the regression analysis in place of the original variables with the knowledge that the meaningful variation in the original data has not been lost. (Rummel, 1967, p. 450-451) In the site evaluation model, factor scores are used as the independent variables in the multiple stepwise regression analysis.

Operationally, factor scores are the primary concern of the analysis of interdependency phase in the site evaluation model. These factor scores are treated as raw scores which are utilized in the analysis of dependency--multiple stepwise regression--as the independent variables. Factor scores are used to estimate the mean monthly sales volume for alternative sites, which in turn, is used to assign meaning to the site alternatives.

Analysis of Dependency: Multiple Stepwise Regression

Multiple regression analysis is concerned with measuring the joint effect of any number of independent variables upon a dependent variable. The multiple regression equation describes the average relationship between several independent variables

and the dependent variables. This average relationship can be used to estimate or control the dependent variable. A linear equation expresses this relationship in the following manner:

$$(1) \quad Y_c = a + b_1X_1 + b_2X_2 \ . \ . \ . \ b_nX_n + R$$

In the manipulation of the regression model a popular procedure is the stepwise solution; it is this procedure that is used in the site evaluation model (see King, 1969, p. 145-48). In the research model, Y_c is the mean monthly sales volume; X_n is the independent variables which are represented by factor scores generated in the analysis of interdependency.

The stepwise solution is used for two purposes. First, to develop the base predictive equation, that is, to estimate Y when Y (sales volume) is known. This base equation is developed in order to obtain two necessary values required for future predictions. The two values are: (1) "a" value, which is a constant that determines the height of the regression plane, and (2) the "b" values, or the net regression coefficients which measure the change in Y per unit change in that particular factor score, holding the other independent variables constant. The second purpose for using the stepwise solution is to use it as the estimating equation when Y is unknown, in other words, to estimate the sales volume of potential site alternatives.

To estimate the sales volume of a potential site, new factor scores are generated for all previous sites plus the particular site to be evaluated. Then, factor scores for all

previous sites are entered in the estimation equation as the new independent variables (X_n). The constant ("a" value) and the net regression coefficients ("b" values) from this base estimation equation are obtained. These "a" and "b" values, along with the factor scores of the site to be evaluated, are then used in an equation to estimate the sales volume (Y_c) for the potential site alternative.

In addition to the predicted Y-value, the "a" value, and the "b" value, the stepwise solution generates other output. It is: (1) the variable entrance order, (2) the coefficient of multiple determination (R^2), and (3) the absolute residual. While these three outputs are not required in the computation of the Y-value, they are necessary to the effective interpretation of the estimated sales volume.

The variable entrance order scales the relative importance of each of the factors in estimating the site's sales volume. The coefficient of multiple determination (R^2) approximates the percent of explained variance and is an expression of how well the estimation equation is estimating. An absolute residual is the unexplained variance that is left in a regression equation. It may be used to help discover and explain the reasons for the unexplained differences between estimated and actual sales volume.

The end result of the analysis act is to obtain estimated sales volume values for each evaluated site alternative. These values represent one measure in the total price utility of that site.

The Valuation Act

The final act in the site evaluation model is the making of a value statement. The model has the capability of assigning an exact value statement in the form of an estimated mean monthly sales volume. This value statement expresses the present worth of the site. It does not express the site's value in the future. The model is designed to evaluate the site in terms of its present primary trading area position and does not attempt to estimate what that position will be in some future time period. In other words, it makes no claim to judge future site-environment relationships and whether or not those relationships would be positive or negative effects on the site from a retailer's perspective.

The "present" nature of the model does not limit its usefulness to the retailer. The statement of the present sales volume potential provides a sound basis upon which to build additional valuation statements. Once the present site value is known, the evaluator can continue the evaluation process to determine the effects on sales volume of future changes in the site and its primary trading area.

In summary, the site evaluation model consists of four operational acts which allow the evaluator to proceed from the selection of theoretical principles to the assignment of a place value statement (a place utility statement). Each of the four operational acts contains the necessary procedures and operational definitions to make the model operative under

real business conditions. Essentially, the model utilizes a site's present relative positon within a primary trading area to assign a present potential sales volume value. This value can then be used as one objective statement of a site's worth. The model recognizes that this value is only one of several values that a firm will utilize in its final site selection decision.

CHAPTER VI

The Case Study Firm

The discussion of the case study firm is divided into three sections. The first describes the firm's retailing activity, its organizational, managerial, and marketing area structure. The second explores the firm's retailing environment in terms of seven retailing elements. The final section is concerned with the firm's site evaluation and selection process.

The Nature of the Case Study Firm

Previous chapters have already established that the case study is: (1) a multi-unit firm, (2) a regional firm, and (3) a chain of steakhouse restaurants. In addition, there are other descriptions employed by the firm's management to describe its retailing operations. First, each store is described as a quick self-service operation which is designed to handle a high customer volume. Second, the product line is characterized by a standard limited menu based on customer popularity and appeal. Third, the product offering is described as high uniform quality. Fourth, the pricing structure is outlined as reasonable. Fifth, the target market is designated as the middle-income subpopulation. Sixth, the

company image is designed to portray a chain of fine family restaurants. Seventh, the store atmosphere is described as "western" or an "authentic ranch-house style." Eighth, the recognition factor is based on a standard trade name and design. Finally, both the selling and management at each store are described as local and personalized. In summary, the firm's operations are geared toward "trying to take the largest slice possible out of middle America."[1]

The Firm: Its Managerial Structure

The managerial structure of the case study firm is illustrated in Figure 2. The president or executive coordinator and the vice president or general manager represent the firm's higher level or strategic management. The principal responsibility of this strategic level of management is the making of decisions which are long term in nature. An example of the firm's locational decisions at the strategic level would be the long-term strategy for opening new market areas. Another example is the final decision to locate and the possible long-term changes in the site's relative potential.

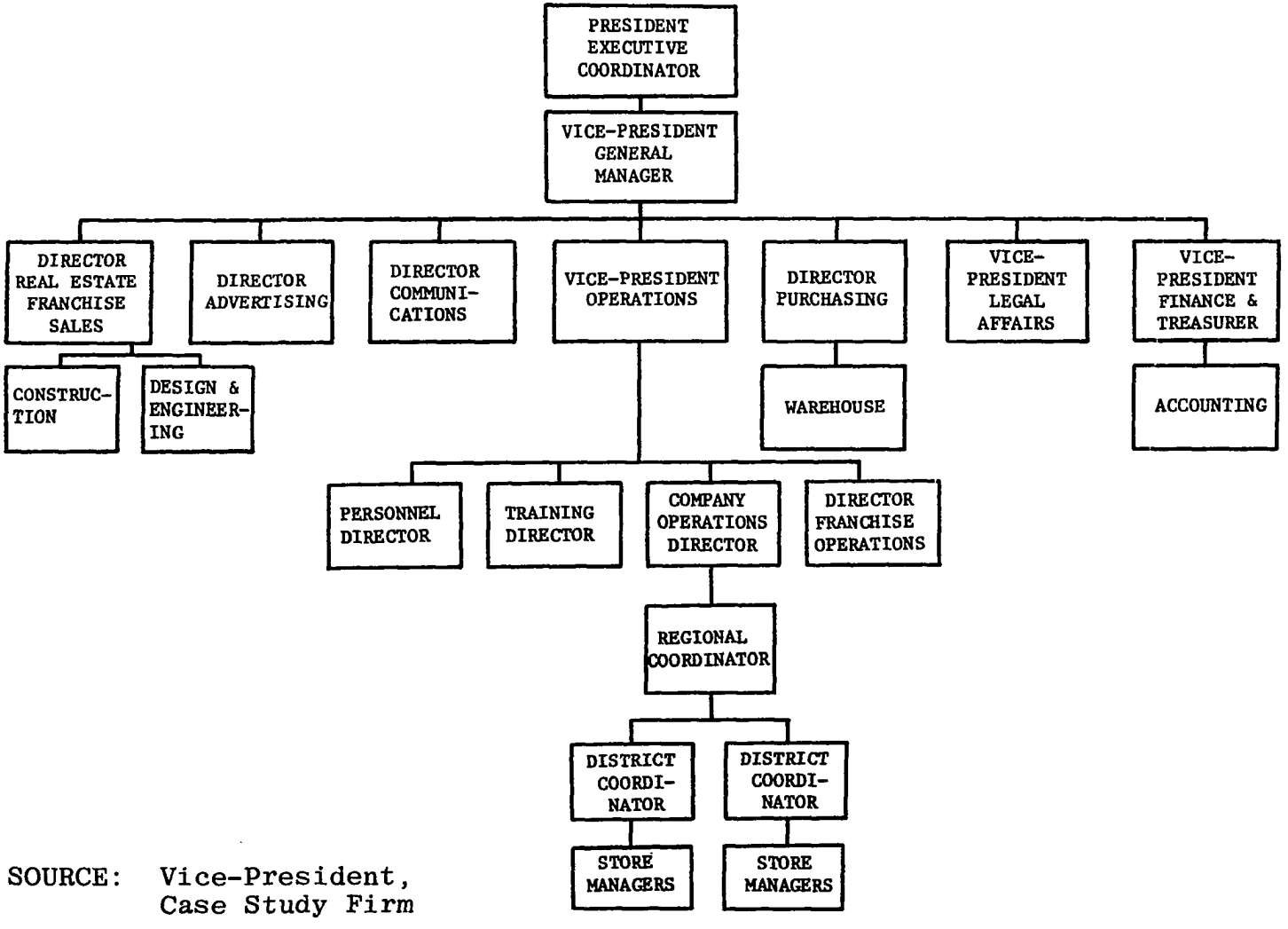
Managerial or middle-level management consists of the various directors and vice presidents of the firm's specific departments. Decisions which affect the firm's operations over an immediate period of time (monthly, annually) are primarily made at the managerial level. Locational decisions

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[1]Personal Interview, Vice President of Operations, Case Study Firm.

FIGURE 2

Managerial Structure



SOURCE: Vice-President, Case Study Firm

regarding the measurement, collection, and evaluation of data to determine the present potential of a site would be appropriate to the middle management of the firm.

Sub-department directors, regional and district coordinators, and individual store managers comprise the lower level or operational management. Day to day market district and store operation decisions are made at this level. Relatively few locational decisions are made by operational management. Any locational decisions made at this level would generally be classified as the need for making in situ adjustments. The need for increasing local advertising to overcome an unfavorable location is one example of in situ adjustment decisions which are made at the operational level of management.

The managerial structure of the firm can also be described as highly centralized with a narrow span of control. The firm's operational and managerial levels of management generally serve the function of information processing units. They are responsible for decisions regarding the selecting, collecting, and analyzing of any data pertinent to a given problem. In most cases, however, final decisions are made at the higher level of management. Regarding the final selection of sites the firm's strategic management makes the final decision.

The retail site evaluation model developed in this research will serve as a valuable tool for the firm's managerial or middle management. It provides the middle manager with a rational set of decisions which will allow him to make

an additional place utility statement (present potential sales volume) concerning various alternative sites. This place utility statement, plus any number of other place utility statements that middle management would care to make, will give the firm's strategic management a sound basis upon which to make the final decision to locate.

The Firm: Its Market Area Structure

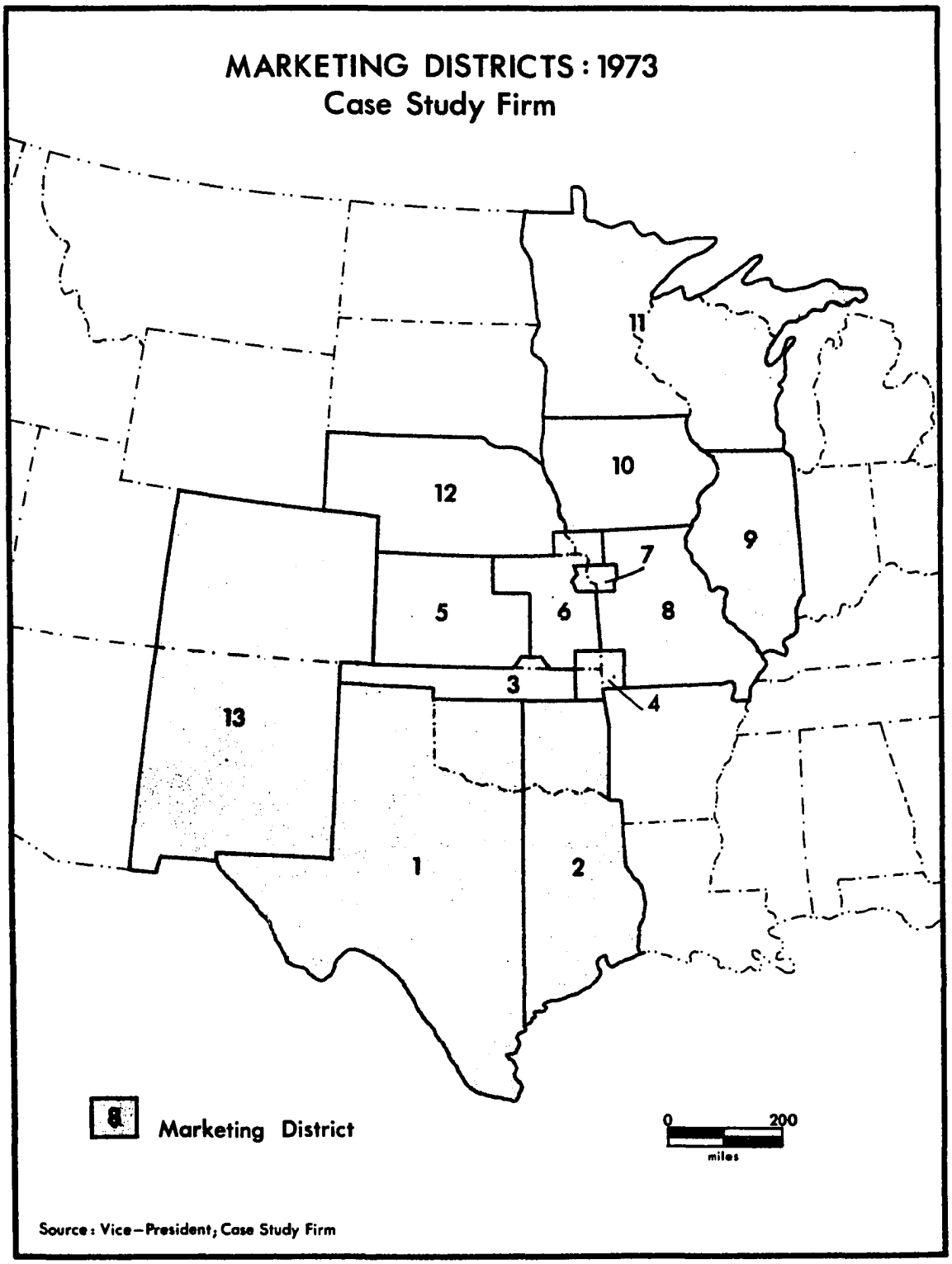
The Central Plains region of the United States comprises the firm's general market area structure. The southern plains area describes the general area of concentration of the firm's marketing activity. More specifically, Oklahoma represents the greatest density of the firm's activities, with Oklahoma City (corporate headquarters) being the principal focal point of the firm's operations.

The firm's market area structure is illustrated in Figure 3. The firm's total market is segmented into thirteen districts. Each district is a management unit headed by a district coordinator. The purpose of establishing these districts is centralized supervision by the home office. The criterion for establishment of each district was the total number of retail outlets which could be adequately supervised by one coordinator. When the number of stores increases within each district to a feasible level, each district could then serve as a sub-regional management center.[2]

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[2]These districts will be adjusted to meet future marketing requirements.

FIGURE 3


MARKETING DISTRICTS : 1973
Case Study Firm
11
10
12
9
7
5
6
8
3
4
13
1
2
Marketing District
0
200
miles
Source : Vice–President; Case Study Firm

The distribution of the firm's individual stores is illustrated in Figures 4 and 5. The firm's retailing outlets can be classified as one of two different operations. First, there are those stores which are owned and operated by the firm itself (Figure 4). Second, the remaining stores are owned and operated by franchisees (Figure 5) under strict supervision of the parent company management.

The distribution of the firm's outlets is characterized by a concentration in Oklahoma, eastern Kansas, and northwestern Missouri. A secondary cluster occurs at the base of the eastern slope of the Rocky Mountains in Colorado. The growth vectors of firm-operated stores is northward into Nebraska, Iowa, and Minnesota, westward into Colorado, and eastward into Illinois.

Figure 5 portrays the distribution of franchised stores. The principal cluster is also in Oklahoma, with the heaviest concentration around the Tulsa area. The franchised growth vectors are: (1) south into Texas, (2) southeast into Louisiana, (3) east into southern Missouri and Arkansas, and (4) west into New Mexico.

In summary, the distribution pattern for both the firm and franchised operations can be described as having one origin, that is, Oklahoma. Within the state, Oklahoma City served as the growth pole for company operations, while Tulsa served a similar function for the franchised outlets. The expansion process of firm-operated outlets is characterized by

FIGURE 4

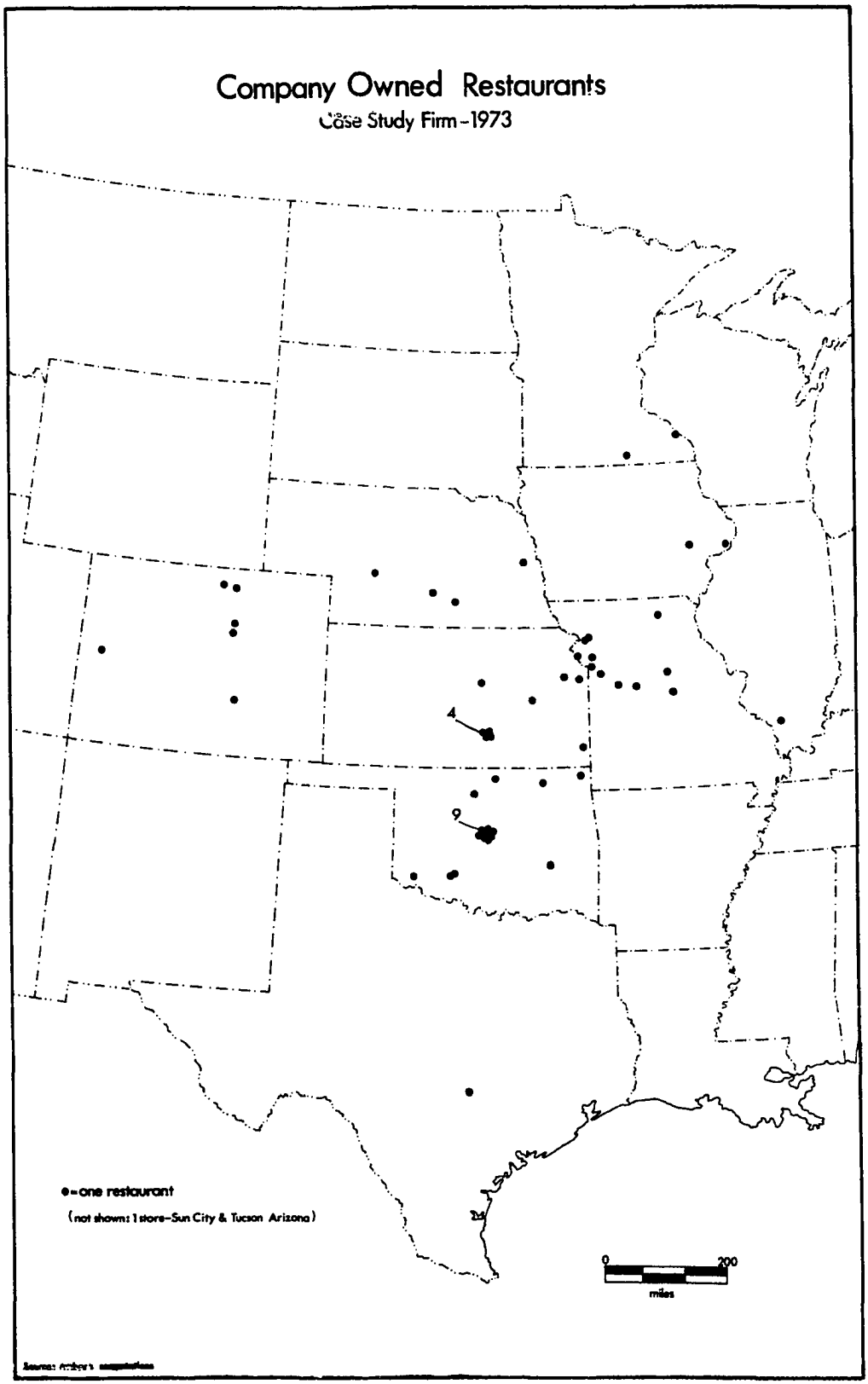
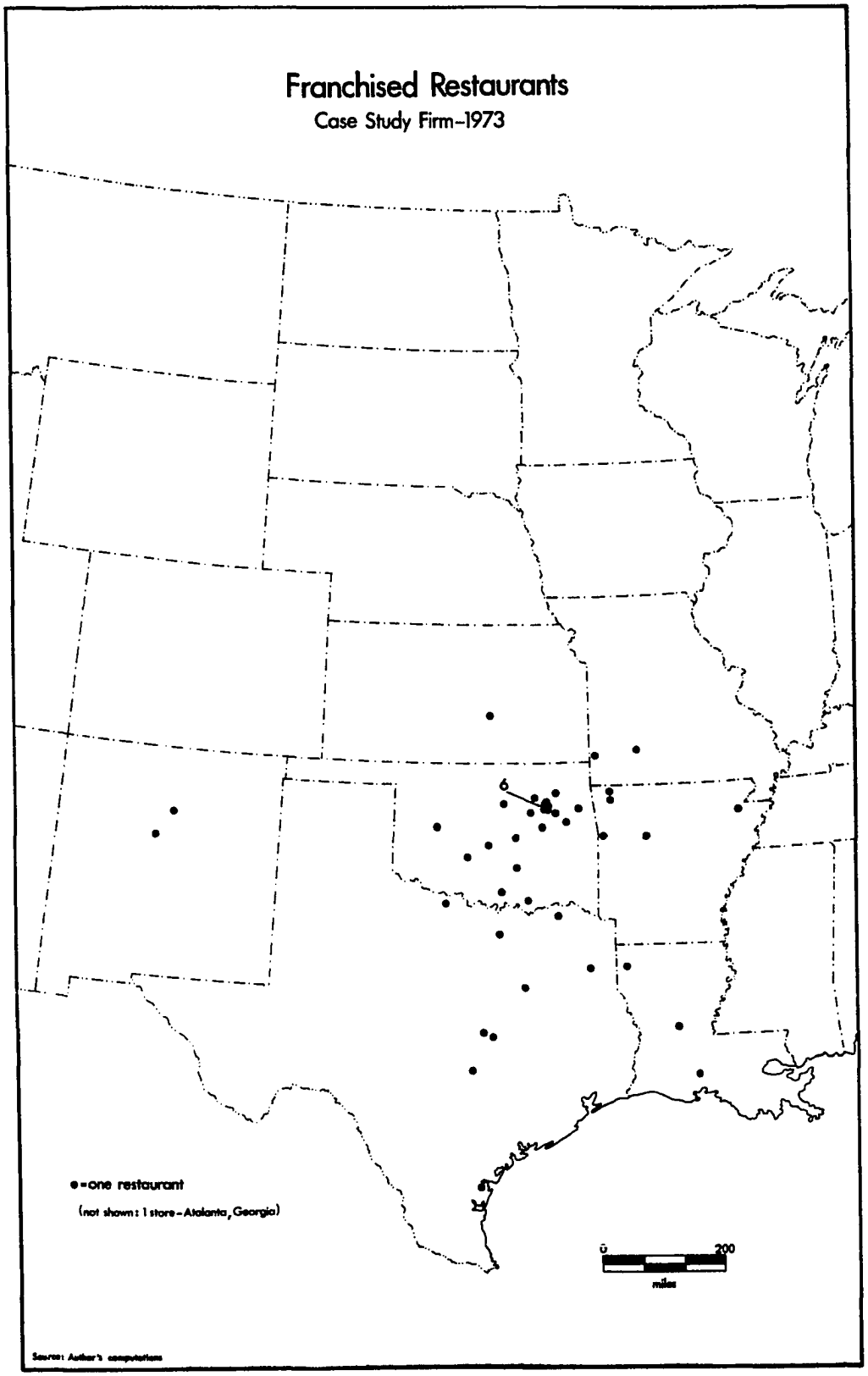

Company Owned Restaurants
Case Study Firm-1973
4
9
●=one restaurant
(not shown: 1 store-Sun City & Tucson Arizona)
0
200
miles

FIGURE 5


Franchised Restaurants
Case Study Firm–1973
●=one restaurant
(not shown: 1 store–Atalanta, Georgia)
0
200
miles

principally a northern diffusion, while a southern diffusion is more characteristic of the franchised operations (Figures 4 and 5).

The Firm's Retailing Environment

The firm's retailing environment will be discussed in terms of the seven retailing elements. The first three elements are considered internal to the firm and are controllable, that is, they can be manipulated by the firm's management. The controllable elements are goods and service mix, communication mix, and distribution mix. Uncontrollable elements are those which are external to the firm and can be influenced only in a very limited sense by the firm's managers. The four uncontrollable elements are competition, consumer demand, relative location, and social and legal restraints. Each of these elements will be discussed relative to the firm's operations. The principal sources of information for the following discussion are company publications and a personal interview with the firm's vice president for company operations.

The Firm: Its Goods and Service Mix

The product mix. The firm's product mix--prepared foods--is illustrated in Table 2. The width of the product mix (number of product lines) is restricted to a limited number of steak cuts, specials, and sandwiches. In addition, there is a limited support menu of beverages, salads, side orders, and deserts. Product mix depth (the average number of

TABLE 2

The Firm's Product Mix

Product Mix	Product Lines	Product Items
Prepared Foods	Steaks	Ground Sirloin Steak
		New York Cut Steak
		Rancher Steak
		Filet Mignon
		Sirloin Steak
	Specials	Fried Chicken
		Fried Shrimp
		Lo-Cal Luncheon
		Daily Specials
		Children's Specials
	Sandwiches	Steak Sandwich
		Hamburger Sandwich
	Beverages	Soft Drinks
		Iced Tea
		Coffee
		Milk
		Hot Chocolate
	Salads	Tossed Salad
		Chef Salad
		Gelatin Salad
	Side Orders	French Fries
		Baked Potato
		Cottage Cheese
		Texas Toast
		Bacon Bits
		Butter
		Sour Cream
	Desserts	Pie
		Gelatin Desserts
		Strawberry Desserts

items offered by the firm within each product line) is limited to approximately four items per product line.

The limited product mix is part of the firm's operational policy. This policy is followed in order to maintain strict centralized management control. Central control is considered desirable from both the output (selling) and input (purchasing) side of the firm's operations. In terms of output, the firm limits the variation in product offerings to a few local daily specials. The adherence to a standard limited menu is viewed by the company's management as one important tool in the maintenance of a consistency in product quality from one store to another.

In terms of input, the firm's management viewpoint is that with fewer sources of supply, there are generally fewer problems. A limited standard menu has fewer product input requirements; therefore, the possibilities of errors and problems in the purchasing and preparing of those products is reduced. A controllable product mix is viewed as one valuable means of controlling the magnitude of supply and preparation problems.

The pricing structure. The firm's pricing structure is designed to attract middle income ($7,000 to $15,000) families. Product item pricing is based on a single price for a basic meal. The basic meal includes the meat (usually a steak), potato (french fries or baked) and toast. Additional product items are priced separately. This base plus individual product

item pricing system is believed to be the most attractive to the widest range of potential consumers. This wide appeal results from the consumer's desire not to be required to purchase a package meal (meat, potato, vegetable, salad, dessert, and drink), but allows him to select and purchase only those items which he wants. Essentially, it is the firm's policy to offer a quality product at a reasonable price. This policy is made possible by generating a high volume business with a minimum of overhead and the acceptance of a minimum acceptable profit margin.

The service mix. "Fast food, self-service" is the service policy of the firm. This service mix is based on management's belief that a large segment of its customers must operate within a limited time schedule; that is particularly true of the luncheon trade. Essentially, the management's belief is that when people come to eat, they demand fast service. Other advantages of fast food, self-service are the potential of a greater customer turnover in a limited space during a limited trade hour period, and the lowering of the operating overhead by the elimination of wages for table service personnel.

The Firm: Its Communication Mix

The firm's communication mix entails both formal and informal procedures. The formal mix contains newspapers, radio, and television, while the informal mix consists of

personalized selling and public relations. The firm invests about three per cent of its gross sales in various promotional activities. Total wide-area promotional coverage accounts for two per cent, while individual store promotions are at about one per cent.

The firm also utilizes several special promotional programs. They include: (1) a free ice cream cone with each meal purchased, (2) discount coupons, (3) price specials, (4) newcomer programs--welcome wagon, and (5) gifts for new babies in the family.

The Firm: Its Distribution Mix

Stores operated by the firm are supplied from one distribution center--a central warehouse in Oklahoma City. The principal channel of distribution is the highway system. Individual stores receive supplies by truck either from the central warehouse or directly from the supplier's warehouse. The distribution mix is currently stable; however, the firm does have plans to create regional distribution points--Kansas City and Denver--when the number of stores and the volume of traffic becomes such that it is no longer feasible to supply the system from one central warehouse.

The Firm: Its Competition

The case study firm has three direct major competitors. They are Bonanza, Pondarosa, and Sizzler. In addition, there are a few small independents whose operations are such that

they are direct competitors. In the latter case, the firm's management is only concerned with this independent competitor in a limited number of cases at the local level. Bonanza and Pondarosa are Eastern-based firms and their operations are primarily located east of the Mississippi River. Sizzler's operations are limited to the Far West with a concentration of activity in California. Therefore, the case study firm does not have direct competition (of the multi-unit, franchised type) in its primary market area except in some isolated cases which occur in the firm's market area fringe.

Mr. Steak is not considered a direct competitor. While the product lines are similar, the service and price structure is different enough that the firm's management feels no competitive threat from Mr. Steak. The firm has on several occasions located in the near vicinity of Mr. Steak without experiencing any noticeable negative effects of direct competition.

Chain restaurants such as Kentucky Fried Chicken, McDonald's, Roy Rogers, Pizza Hut, Sambo's, Taco Bell, or independent restaurants and cafes are not considered or treated as competitors. Rather, the management's concern about them is to form a positive viewpoint. The location of such establishments in an area is considered an advantage, not a disadvantage. The principle of cumulative attraction is ascribed to by the firm's managers. In summary, the firm has no direct competition except in isolated cases. The major competition concern of the management is store (restaurant) saturation in a given trade area.

The Firm: Its Consumer Demand

The firm's management has based the potential growth of the firm on two premises of customer demand. First, the consumer demand for beef products in the United States has historically been high. Second, the consumer demand for reasonably priced and good quality beef will continue to increase. While the firm has no formal procedure of determining the consumer demand for any given area, the following factors are subjectively considered: (1) the density of population, (2) the income level of the population, (3) the family structure (number of children) of the population, and (4) the general appearance of the trade area. This uncontrollable element of the firm's retailing environment is treated by the firm as having both spatial and time variations. These variations can be measured, at least in a subjective sense, by the time and spatial variations in population characteristics.

The Firm: Its Relative Location

The firm has a limited degree of control over a site's relative location only in the initial site selection process. Initially, the firm selects sites in which the pertinent environment is considered by management to be advantageous. Once the site is selected, however, the firm is stripped of most of its control factors regarding that site's primary trading area.[3]

[3]There are certain control factors which operate after the initial selection process. For example, zoning laws, building regulations, legal commitments, and social restraints.

The case study firm, in its attempts to ensure longevity of its sites, attempts to evaluate subjectively the site's long-term relationships to its primary trading area. The firm's management used several "rules of thumb" in evaluating site-environment relationships. They are: (1) select sites in areas in which the land-use characteristics and density are already established, or select sites in areas in which there is a reasonable probability of predicting the future land-use characteristics and density; (2) select sites in areas which contain the necessary activities (eating establishments, office buildings, retailing outlets) which will attract consumers to that area--the principle of cumulative attraction; (3) select sites in areas which are characterized by a balance between residential and commercial land uses; (4) select sites in areas in which the residential areas are primarily owner-occupied and in which there is a large family element--the principle of land-use stability; (5) select sites in areas which have heterogenous population residential areas, that is, avoid areas which are characterized by a single ethnic group or distinct sub-population; and (6) select sites in areas which have the potential to attract new generative activities. The above subjective criteria are not mutually exclusive; however, the decision rules are an attempt by the firm to account for the present and future relative position of its retailing sites.

The Firm: Its Legal and Social Restraints

The case study firm operates within the same legal and social restraints that all retail firms must operate under.[4] Legal restraints are generally considered at two levels. First, there are corporate level restraints that require the firm to meet legal requirements of state and federal governments. For example, state and federal regulations regarding employment practices, accounting procedures, financial arrangements, and taxation are all legal restraints with which the firm must comply. The second level of legal restraints are those which are imposed by local governments. In the evaluation and selection of sites the firm's management considers these restrictions as being far more important than those cited above. Local legal restraints which influence the firm's locational decision process are: (1) zoning regulations, (2) building codes, (3) store and sign setback regulations, (4) local tax structure, (5) store hour restrictions, and (6) regulations affecting public services--water, sewage, police, and garbage pickup. Because of the variation in local restrictions, the firm does not have a formal procedure of site evaluation; generally each of the above-mentioned factors are checked to determine whether or not any of them are prohibitive.

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[4]In addition, restaurants are subject to state and local health and sanitation regulations.

Social restrictions are usually influential in the firm's locational process at the local level. Examples of social restrictions which are considered by the firm are (1) the life style of the local consumer in terms of his propensity to dine out, (2) the antipathy of the local business community to an outside firm doing business within the community, (3) the type of areal association which tends to create a negative or positive attraction factor, for example, avoiding sites near funeral homes but locating near churches, and (4) the degree of in-home entertainment activity as compared to entertainment sought away from home. As in the case of legal restraints, the management attempts to determine whether or not there are any social traditions, practices, or values which would be either prohibitive or helpful in promoting trade.

The Firm's Locational Evaluations and Decisions

Previous sections have been concerned with the case study firm's retailing activity. This section deals with the firm's locational problems in terms of evaluations and decisions. In this section, the discussion centers on five issues; they are (1) the firm's locational decision makers, (2) the firm's locational goals, (3) the firm's regional market area evaluations and decisions, (4) the firm's trade area evaluations and decisions, and (5) the firm's site evaluation and decisions.

The Firm's Locational Decision Makers

The firm's final locational decisions are made at the strategic management level (Figure 2). Managerial and operational management, however, have numerous decision responsibilities with regard to the selection of evaluation techniques, criteria, and measurements. These middle and lower management levels are responsible for obtaining and presenting of the hard data which is used in the final site selection process by top management.

The director of real estate and franchise sales is the principal individual within the firm who is directly responsible for conducting trade area and site evaluations. The real estate director has the responsibility of searching out possible alternatives, gathering data on acceptable alternatives, limiting the number of acceptable alternatives, analyzing the data, presenting the evaluated alternatives to a group conference of middle management (for example, the advertising director, vice president of operations, vice president of legal affairs) for their consideration and evaluation, and to present the conference recommendations to either the general manager or the president.

In the final analysis, the firm's locational decisions represent a cumulation of decisions made by all levels of management. While the final locational decisions are made by the strategic management, those decisions rest on numerous decisions made at the middle management level.

The Firm's Locational Goals

The firm's management has established several locational goals; however, these goals are neither clearly defined nor permanently established. The locational goals of the firm can be expressed as vertical growth, horizontal expansion, and reasonable profit. The first goal is the firm's desire to increase the total sales volume by attracting a greater share of the market from present trading areas. The second goal is the firm's desire to increase the total sales volume by developing new markets and opening new trade areas. The last goal is related to the management need of obtaining a fair return on its investment.

For each goal cited above, the firm's management has identified only broad aspiration levels. While the limits of those aspiration levels will not be discussed here, there are three general characteristics which describe the nature of the firm's aspirations. First the firm's aspiration levels tend to adjust upward or downward depending on the firm's operational experiences. Second, the firm tends to adjust its aspiration levels to those that are attainable. Finally, the firm has defined a lower limit to its aspirations and this limit represents a threshold level below which the firm will not go without initiating some form of action. In summary, the firm has goals and aspirations which tend to be loosely defined and reasonably flexible. Nevertheless, these goals do provide a general direction for the firm managers.

The Firm's Regional Market Area Evaluations and Decisions

A regional cluster market plan has been adopted by the firm's management. Six steps are entailed in the cluster plan. First, clusters of cities which have a minimum population level are identified. Second, the hierarchical structure of the cluster is determined.[5] Third, a city in the upper hierarchical structure is selected for the initial entry into the market area. Fourth, the initial store is given strong support in terms of promotional investment and managerial attention. Fifth, the local store management and district (cluster) coordinator initiate data collection procedures for new sites within the cluster. Finally, new sites in the cluster are evaluated and selected. This cluster plan, although relatively new, has already become apparent in the distribution of the firm's operation (Figure 4).

From a management viewpoint the advantages are several. First, there is mutual support of stores in terms of personnel, supplies, and customer familiarity and customer recognition of the firm's operations, management supervision and control, test marketing the area for the firm's operations, and built-in procedures for the evaluation and selection of new sites. The cluster plan is viewed by the firm's management as a "means of taking the cream of the crop," that is, a system

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[5]While the hierarchy is generally determined on the basis of population, other criteria are also used. For example, ease of entry into the market, familiarity of the city, and so forth.

for entering the market areas which are believed best suited for the firm's particular type of operation.

The Firm's Trade Area Evaluations and Decisions

The firm's procedures for evaluating, analyzing, and selecting trading areas are largely informal. Formal procedures such as a list of weighted criteria, prescribed methods of analysis, and quantitative decision rules are not utilized by the management in evaluating and selecting trade areas. The procedures for trading area analysis are unstructured in the sense that information is collected in a "piece-meal" fashion; that is, it is gathered as the immediate need dictates. Management bases its trade area decision on what it terms a "feel" by the cumulative experience of the firm's personnel for those areas in which the firm can operate successfully.

While the firm does not have formal evaluation procedures, it does subjectively consider carefully several trade area characteristics. Those characteristics are: (1) the total population in terms of magnitude and density, (2) the population structure in terms of income levels, family structure (size), ethnic composition, and occupational breakdown, (3) the land-use character in terms of type and density, (4) the nature of the economic support of the area--agricultural, industrial, or commercial, (5) the economic growth rate, (6) the availability of financial backing, (7) the availability of land, and (8) the consumer demand for the firm's type of

operation. In obtaining information concerning the above characteristics, the firm utilizes such sources as the local banker, real estate developers, local business contacts, state and local records and publications, and personal visual inspection. Once this information is gathered, analyzed, and judged favorable, the firm starts the process of selecting a particular site within the trade area.

The Firm's Site Evaluations and Decisions

The firm's site evaluations and decisions are also conducted in an informal fashion. Measurement and analysis techniques are largely subjective. While the firm utilizes several of the evaluation principles discussed in Chapter IV, these principles are not clearly specified in the formal sense in that direct or indirect measurements are obtained and analyzed. The principles are used more as general guidelines in the evaluation process.

The competition guidelines. In the firm's evaluation of sites, competition is one of the first considerations. As was stated earlier, in most cases, indirect competitors (any restaurant except a fast-food, self-service steakhouse) are treated as elements which make a positive contribution to the place utility of a site. This positive contribution is expressed as cumulative attraction or store association. In some cases the firm used the location selections of certain successful franchised chains as a key in weighting the value

of a site and its pertinent environment. For example, if a McDonald's Hamburger establishment is in the general area, the firm will tend to add additional weight to a site which they are considering in the same area.

The compatibility guidelines. The firm's management believes that it is more compatible with certain types of economic activity. First, the firm's compatibility with residential areas is a major concern in the firm's attempt to obtain a balanced trade area between the noon and dinner hours. Middle income family residential areas are considered the most compatible to the firm's operations; therefore, a weighted consideration is given to such a residential area. Second, the firm's management believes that its compatibility is much greater with commercial activities that employ "white collar" rather than "blue collar" workers. This is based on the belief that white collar workers tend to eat out more often (especially during the noon hour) than blue collar workers who tend to "brown bag it." In addition, white collar commercial activities are believed to have greater "drawing power" in terms of potential consumers outside the immediate trade area.

The accessibility guideline. The accessibility factor in the firm's evaluation process is treated as having a limited influence. Accessibility is important in the initial opening of the store and in the attraction of transient trade. A large percentage--70 to 80 per cent--of the firm's business, however, is return trade. It is thought that this segment of

the trade is well enough acquainted with the street pattern that easy accessibility and visibility will not be a major factor in the consumers' patronage decision. This is not to say that the firm considers accessibility unimportant, only that there are many other location factors which are more important. While good accessibility is desirable, it is not absolutely essential. In the final analysis, accessibility and visibility measurements are gathered and analyzed by the management; however, in the final decision process these factors are given limited consideration.

The store saturation guideline. Store saturation is given little consideration in the firm's evaluation process. The firm's evaluator does take note of the intensity of direct and indirect competition. Only when the intensity of competitive activity in a given area is of such a magnitude that obvious problems could be encountered does the firm give the problem of saturation careful consideration.

The commercial turnover rate guideline. The firm's evaluation process does consider the commercial turnover rate. In evaluating the general area around a site the firm's evaluator will attempt to determine the failure rate of retailing establishments. Areas which have a high turnover rate (several business entries and failures) are considered "cold spots" and are to be avoided. A low turnover rate and a continuous growth rate (new entries) are treated as "hot spots" and are given additional consideration.

The interception guideline. The firm makes no effort at determining whether or not a site is so situated as to act as in interceptor of a competitor's business. The firm does try, however, to determine the qualities of a site as to its ability to intercept potential customers on their way to work, home, shopping, and so forth. Traffic volume counts are considered very carefully by the evaluation staff.

The land price guideline. Land prices are a major factor in the firm's site evaluation program. The great variation in land prices has caused the firm's management to consider carefully the long-term effects of the land investment cost. While the firm is able to compete with almost any other retailing activity for a particular site, the benefits derived from an expensive site must be such that it clearly justifies the land cost. For example, if the firm had a choice of two sites within a given trade area in which the difference in land prices was $40,000, the more expensive site would have to be judged as being capable of attracting at least 25 per cent higher annual sales volume before the firm would consider it for acquisition. Even then, it would take several years of operation to make up the land price differential between sites. In the firm's site evaluation and selection process, land prices are often the key consideration in the final decision to locate.

The physical structure guidelines. In site evaluation, the firm considers the physical characteristics of a site early

in the process. Shape, size, and front footage are all considered in the initial evaluation process. If the site cannot meet the minimum requirements of physical layout and size, the evaluation process is terminated. If these initial requirements are met, then the firm considers such physical features as slope (grade and fill requirements), drainage, and geologic structure. These features are examined with respect to their effects on the construction cost. While the terrain construction costs are not, in most cases, prohibitive, they are given a relatively important role in the evaluation process.

The site evaluation guidelines discussed above encompass the firm's primary evaluation criteria. The firm does consider such factors as whether or not the site is on a corner or in the middle of the block; whether or not the principal traffic artery has a raised median; the number of traffic lights and their effect on the flow of traffic into and out of the site; the speed limit of the principal traffic artery; and, the barriers which might interfere with the site's accessibility and visibility, for example, one-way streets, railroad crossings, and interstate highways. These factors are given limited weight in the evaluation process.

In summary, Chapter VI has presented a general description of the firm's operations in terms of its organizational, managerial, and market area structure. In addition, the firm's controllable retailing mix was discussed, as well as those elements of the firm's retailing environment over which the firm has no control. Finally, the firm's location decision process and its site evaluation procedures were examined.

CHAPTER VII

An Application of the Site Evaluation Model

The preceding chapters have provided the theoretical framework and the operational procedures necessary for the implementation of the site evaluation model. The purpose of this chapter is the implementation of the model using real business data. More specifically, the purpose is to report the results of the model's application to the case study firm and to answer the research question: Can relative location variables be used to estimate successfully the potential sales volume of alternative retail sites; that is, can the positional qualities of a site within a defined relative environment (trade area) be used to evaluate alternative sites as to their sales volume potential?

To facilitate the discussion and understanding of the applicability and implementation of the site evaluation model, a distinction must be made between two general operational procedures. The operational procedures are essentially two different applications of the site evaluation model. The first application is referred to as the "base" model, while the second application is termed the "estimation" model.

The two different applications of the site evaluation model provide the structural framework for Chapter VII. The

first discussion draws the distinction between the base and the estimation application models. The second discussion relates the implementation of the base model and the results of that implementation. Next, the results of the application of the estimation model are discussed. Finally, the combined results of both the base and estimation models are reviewed.

Operational Procedures: Base and Estimation Models

In the initial application of the site evaluation model, it is necessary to develop a base model. The purposes of the base model are: (1) to establish the general linear relationship between the known[1] dependent variable (average monthly sales volume) and the known independent variables (relative location variables expressed as factor scores on "n" factored dimensions), and (2) to provide the necessary base (number of cases--sites) required in the estimating procedures utilized in the estimation model. The second purpose needs some elaboration. The use of regression analysis requires that the number of cases should exceed the number of independent variables by the largest ratio possible.[2] This requirement becomes especially important when the regression

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[1]The average monthly sales volume data was supplied by the case study firm from its sales records. This information was known prior to the original dependency analysis and was used in order to develop the plane relationship between it and the independent variables.

[2]The minimum acceptable ratio is generally thought to be a ratio of 3 cases to 1 independent variable. It should be noted, however, that even a 3 to 1 ratio is suspect.

coefficients from one analysis (sample) are used in the estimation procedures of another analysis (sample). If the ratio between cases and independent variables is not sufficiently large, a sample cross-validation problem occurs. This problem will result in erroneous estimations for each new sample taken.

The base model is essentially the first application of the site evaluation model. The base model consists of ten sites which were randomly selected from a total population of fifteen sites.[3] Sites designated as A, B, C, D, E, F, G, H, I, and J are those which are used in the base model analysis. The procedural steps of the base model are illustrated in Figure 6 and explained in Table 3.

The estimation model includes those procedures by which the unknown[4] independent variables (average monthly sales volume) are estimated for each new additional site. The new additional sites are designated as K, L, M, N, and O. Procedural steps of the estimation model are illustrated in Figure 6 and explained in Table 4. It is this estimation model and its generated results that are the principal focus of this study. For in the final analysis, the resulting estimation and the respective error statements will be the decisive factors in determining the success or failure of the site evaluation model.

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[3]The total population of possible sites is defined as those sites of the case study firm which had an operational life of at least one year at the time of the inception of this study (June, 1972).

[4]The average monthly sales volume was known at the time of the dependency analysis. This information was furnished to the research after the firm received the estimated sales volume for a particular site. This allowed for a residual analysis between actual sales volume and the estimated sales volume.

FIGURE 6

Operational Procedures: The Base and Estimation Model

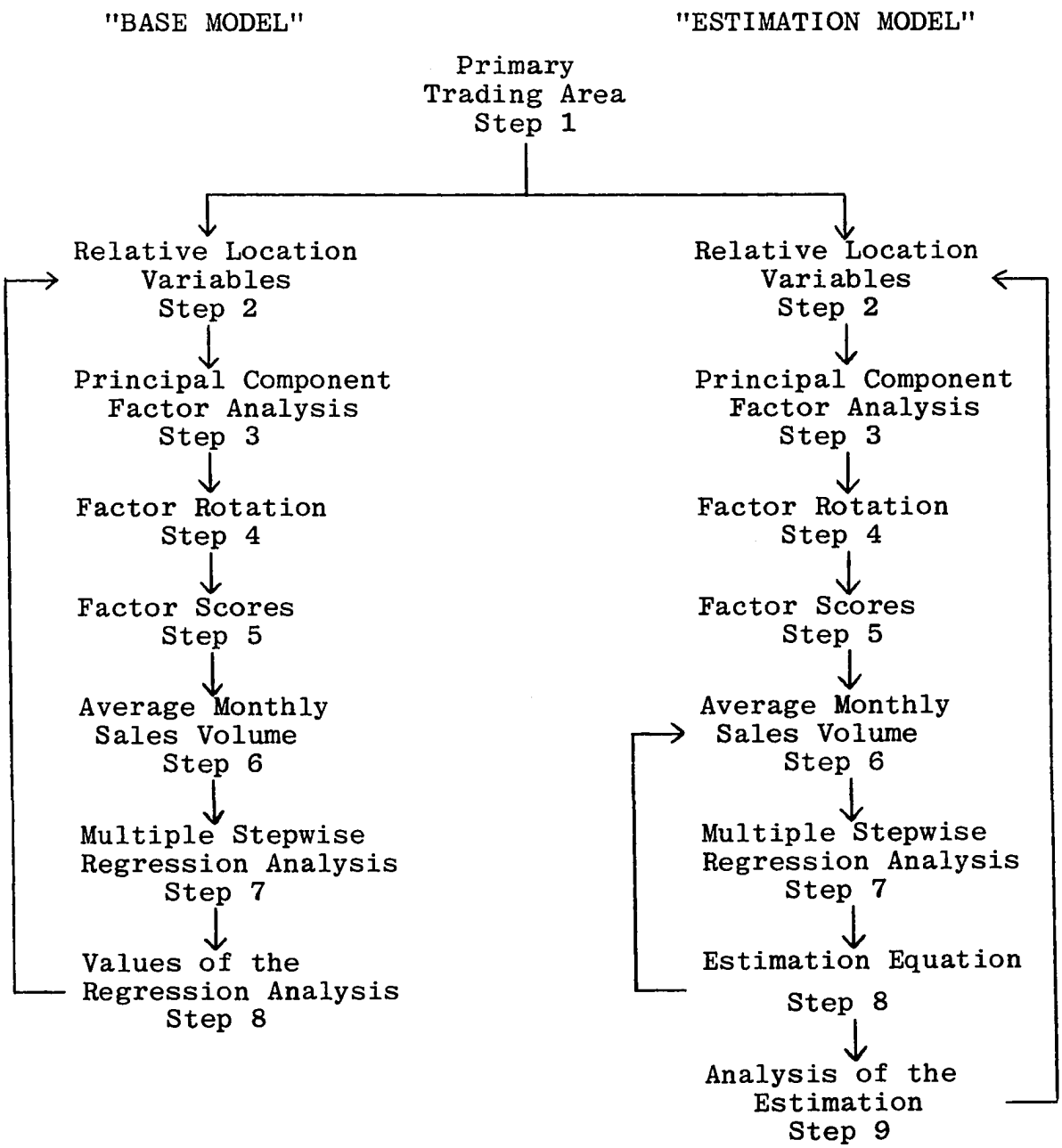


TABLE 3

Operational Steps: The Base Model

Step	Operational Procedures
1	Primary Trading Area (P.T.A.) The first step is to determine the P.T.A. (The procedures for determining the P.T.A. are outlined in Chapter V.) The purpose for determining the P.T.A. is that it serves as source region of the relative location measurements for all of the firm's sites.
2	Relative Location Variables (R.L.V.) The second step is to obtain measurements for the R.L.V. ($X_1X_2...X_q$) for sites A, B,...J. The measurement units and procedures are outlined in Chapter V. The R.L.V. measurements are used as raw data inputs in the principal component factor analysis.
3	Principal Component Factor Analysis (P.C.F.A.) The third step is to perform a P.C.F.A. on R.L.V. ($X_1X_2...X_3$) for sites A, B,...J. The analysis is performed by a standard computer program BMDO3M. P.C.F.A. is used to analyze the interdependence of the R.L.V. The initial output is an unrotated factor matrix for "N" factored dimensions.
4	Factor Rotation. The fourth step is to rotate the unrotated factor matrix in an orthogonal fashion. The enhancement of dimension interpretation is the primary purpose for the rotation. The eigen-value-one criterion is used to determine the number of factored dimensions. The interpretation and the naming of the factored dimensions are the final task in the fourth procedural step.
5	Factor Scores. The fifth step is to estimate the factor scores for the factored dimensions $D_1D_2...D_n$ for sites A, B,...J. The estimated factor scores will be used as the independent variables in the analysis of dependence.

TABLE 3

(Continued)

Step	Operational Procedures
6	Average Monthly Sales Volume (A.M.S.V.) The sixth step is to obtain from the records of the case study firm the A.M.S.V. for sites A, B,...J. The A.M.S.V. is the dependent variable in the subsequent regression analysis.
7	Multiple Stepwise Regression Analysis (M.S.R.A.) The seventh step is to perform a M.S.R.A. between the dependent variable (A.M.S.V.) and the independent variables (factor scores on "N" dimensions) for sites A, B,...J. Computer program BMDO2R is used to perform the analysis. The dependence of A.M.S.V. on relative location (as measured by factor scores on "N" dimensions) is the principal purpose of the analysis.
8	Values of the Regression Analysis. The eighth step is to analyze the values generated by the regression analysis. Regression values such as (1) the coefficient of determination (R^2), (2) the variable entrance order, and (3) the absolute residual, are given insight into the dependence of A.M.S.V. on relative location. This insight could lead to an adjustment in the relative location variables selected.

TABLE 4

Operational Steps: The Estimation Model

Step	Operational Procedures
1	Primary Trading Area (P.T.A.) The first step is to determine the P.T.A. The P.T.A. has already been determined and discussed in the discussion of the base model; the reader is referred to that discussion.
2	Relative Location Variables (R.L.V.) The second step is to obtain measurements of the R.L.V. ($X_1X_2...X_9$) for all previous sites plus one additional new site. The measurement units and procedures are outlined in Chapter V. The R.L.V. measurements are used as raw data inputs in the principal component factor analysis.
3	Principal Component Factor Analysis (P.C.F.A.) The third step is to perform a P.C.F.A. on R.L.V. ($X_1X_2...X_9$) for all previous sites plus one additional new site. The analysis is performed by a standard computer program BMDO3M. P.C.F.A. is used to analyze the interdependence of the R.L.V. The initial output is an unrotated factor matrix for "N" factored dimensions.
4	Factor Rotation. The fourth step is to rotate the unrotated factor matrix in an orthogonal fashion. The enhancement of dimension interpretation is the primary purpose for rotation. The eigen-value-one criterion is used to determine the number of factored dimensions. The interpretation and the naming of the factored dimensions is the final task in the fourth procedural step.
5	Factor Scores. The fifth step is to estimate the factor scores for the factored dimensions $D_1D_2...D_3$ for all previous sites plus one additional new site. The estimated factor scores will be used as the independent variables in the analysis of dependence.

TABLE 4

(Continued)

Step	Operational Procedures
6	Average Monthly Sales Volume (A.M.S.V.) The sixth step is to obtain from the records of the case study firm the A.M.S.V. for all previous sites* but NOT for the new additional site. The A.M.S.V. for the new additional site is the one which the site evaluation model is attempting to estimate. The previous A.M.S.V. are the dependent variables in the subsequent regression analysis. *In cases where the A.M.S.V. cannot be obtained from company records, the estimates made for the previous evaluated sites by the site evaluation model will be used. See Step 8.
7	Multiple Stepwise Regression Analysis (M.S.R.A.) The seventh step is to perform a M.S.R.A. between the dependent variable (A.M.S.V.) and the independent variables (factor scores on "N" dimensions) for all previous sites but NOT for the new additional site. Computer program BMDO2R is used to perform the analysis. The dependence of A.M.S.V. on relative location (as measured by factor scores on "N" dimensions) is the principal purpose of the analysis.
8	Estimation Equation. The eighth step is to estimate the average monthly sales volume for the new additional site. The equation utilizes the factor scores developed in Step 5 and the regression coefficients developed in Step 7.
9	Analysis of the Estimation. The final step is to analyze the estimation. The analysis of each estimate is accomplished by examining the residual between the estimated sales volume and the actual sales volume. Residual analysis is made possible in this particular study because the selection criterion for each new additional site is that it has had an operational life of at least one year. It should be noted that residual analysis will not be possible when the site evaluation model is put into operation, that is, used to evaluate new sites which are currently being considered for possible future sites. Before the site evaluation model is used to evaluate potential sites, however, it will have been tested numerous times, so that the standard error of the estimate will be well known. This standard error of the estimate can then be used to judge the validity of the estimate for new potential sites.

The Base Model

The implementation of the base model consists of the eight operational steps illustrated in Figure 6 and discussed in Table 3. The primary purpose of the following discussion is to examine the results which occurred with the model's implementation.

Primary Trading Area

The primary trading area is that limited segment of the total trade area for which information concerning the site's relationships, linkages, and interactions can be obtained up to the point where the cost of obtaining additional information exceeds the value of that information to the firm's evaluators. The purpose of the primary trading area is that it serves as the source area from which measurements of the relative location variables are obtained at an acceptable cost.

Operationally, the primary trading area is determined by selecting the distance classes which have an acceptable "total value of information." The total value of information for each distance class is defined by the equation:

$$\frac{\text{Weighted Value of Distance Class}}{\text{(Total Area)} \qquad \text{(Unit Cost)}}$$

Where: Weighted Value of Distance Class is the intensity of customer-site relationships, linkages, and interactions for each distance class; expressed as a cumulative percentage of the total customer-site relationships, linkages, and interactions.

Total Area is the square of the diameter of each distance class multiplied by the constant .7854.

Unit Cost is the constant cost for obtaining measurements of relative location variables per city block.

The acceptable total value of information and, therefore, the primary trading area, will vary from one firm to another. This variation will depend on two factors; first, the difference in the value of information from one distance class to another, and second, the internal resources of the evaluation unit. In this particular research the primary trading area was determined to be the first distance class (0-.99 miles). Table 5 illustrates the justification of this decision. In Table 5, the total value of information is given by information[5] type and distance class. Five different types of information (cases) with five different distance classes for each type are illustrated. In each case, the total value of information for the first distance class (0-.99) is at least three times that of the next distance class (0-1.99). Furthermore, in examining the customer's nearest relationship, it can be observed that the first distance class constitutes 48.8 per cent of the total distance class weight. In other words, 48.8 per cent of the firm's total customers had as their immediate origin or intended destination, a point which is located within one mile of the firm's site. In this same case, if the second distance is included, there is an increase in total information of 18.6 per cent; however, there is a 300

[5]Information is taken to mean the general nature of the customer-site relationships, linkages, and interactions.

TABLE 5

Total Value of Information; by Type of Interaction and Distance Class

Type of Information	Distance Class[1]	Total Area[2]	Unit Cost[3]	Weighted Value of Distance Class[4]	Total Value of Information[5]
	0 - .99	3.1416	1	21.9	6.97
Customer's	0 - 1.99	12.5664	1	28.2	2.24
Place	0 - 2.99	28.2744	1	41.5	1.47
of	0 - 3.99	50.2656	1	50.6	1.01
Residence	0 - 4.99	78.5400	1	55.9	.71
	0 - >5	-------	1	100.0	----
	0 - .99	3.1416	1	19.5	6.21
Customer's	0 - 1.99	12.5664	1	22.8	1.81
Place	0 - 2.99	28.2744	1	31.8	1.13
of	0 - 3.99	50.2656	1	40.5	.81
Employment	0 - 4.99	78.5400	1	45.4	.58
	0 - >5	-------	1	89.7	----
	N.E.[6]	-------	---	----	----
	0 - .99	3.1416	1	41.1	13.08
Customer's	0 - 1.99	12.5664	1	49.1	3.91
Place	0 - 2.99	28.2744	1	64.3	2.27
of	0 - 3.99	50.2656	1	73.4	1.46
Origin	0 - 4.99	78.5400	1	78.6	1.00
	0 - >5	-------	1	100.0	----

TABLE 5

(Continued)

Type of Information	Distance Class	Total Area	Unit Cost	Weighted Value of Distance Class	Total Value of Information
	0 - .99	3.1416	1	35.3	11.24
Customer's	0 - 1.99	12.5664	1	43.2	3.44
Place	0 - 2.99	28.2744	1	57.6	2.03
of	0 - 3.99	50.2656	1	67.5	1.34
Destination	0 - 4.99	78.5400	1	72.4	.92
	0 - >5	-------	1	100.0	----
	0 - .99	3.1416	1	48.8	15.53
Customer's	0 - 1.99	12.5664	1	57.9	4.61
Nearest	0 - 2.99	28.2744	1	70.5	2.49
Relation-	0 - 3.99	50.2656	1	79.9	1.59
ship[7]	0 - 4.99	78.5400	1	84.9	1.08
	0 - >5	-------	1	100.0	----

SOURCE: Compiled by author from field observations.

[1]A total value of information statement was not calculated for the last distance class (>5) because no mean weights can be allocated within this distance class.

[2]Total area is calculated by taking the diameter of each distance class, squaring it, and multiplying by .7854.

[3]Unit cost is taken as a constant cost for obtaining measurements of relative location variables per city block.

[4]Weighted value of distance class is the intensity of customer-site relationships, linkages, and interactions for each distance class. It is expressed as cumulative percentage of total relationships, linkages, and interactions.

[5]Total value of information is:

$$\frac{\text{Weighted Value of Distance Class}}{\text{Total Area times Unit Cost}}$$

[6]N.E. means not employed.

[7]Customer's nearest relationship is defined as the customer's nearest distance class, be it the customer origin or destination.

per cent increase in area, therefore a 300 per cent increase in cost. It is on the basis of the above stated relationships that the decision of defining the primary trading area as distance class 0 - .99 was made. With the definition of the primary trading area, measurements of the relative location variables are gathered.

Relative Location Variables

Measurements of the nine relative location variables are presented in Table 6.[6] To facilitate the discussion of the variables for the base model sites, Figure 7 was constructed. In Figure 7, the standard deviation of each site is illustrated for the site's average monthly sales volume and for the nine relative location variables. The discussion of the variables will be conducted on a site-to-site basis. Each site discussion will consist of a subjective description of the site, followed by a description of the dispersion characteristics.

Site A. Site A is located on a principal commuter highway in a suburb of a major southwestern city.[7] The site occupies an interior block position on a continuous commercial strip. There are several commercial and industrial clusters within one driving mile. Visually, the land-use complexion

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[6]See Chapter V for a discussion of why these nine variables were selected.

[7]A major city is defined as one that has a population of 100,000 or more.

TABLE 6

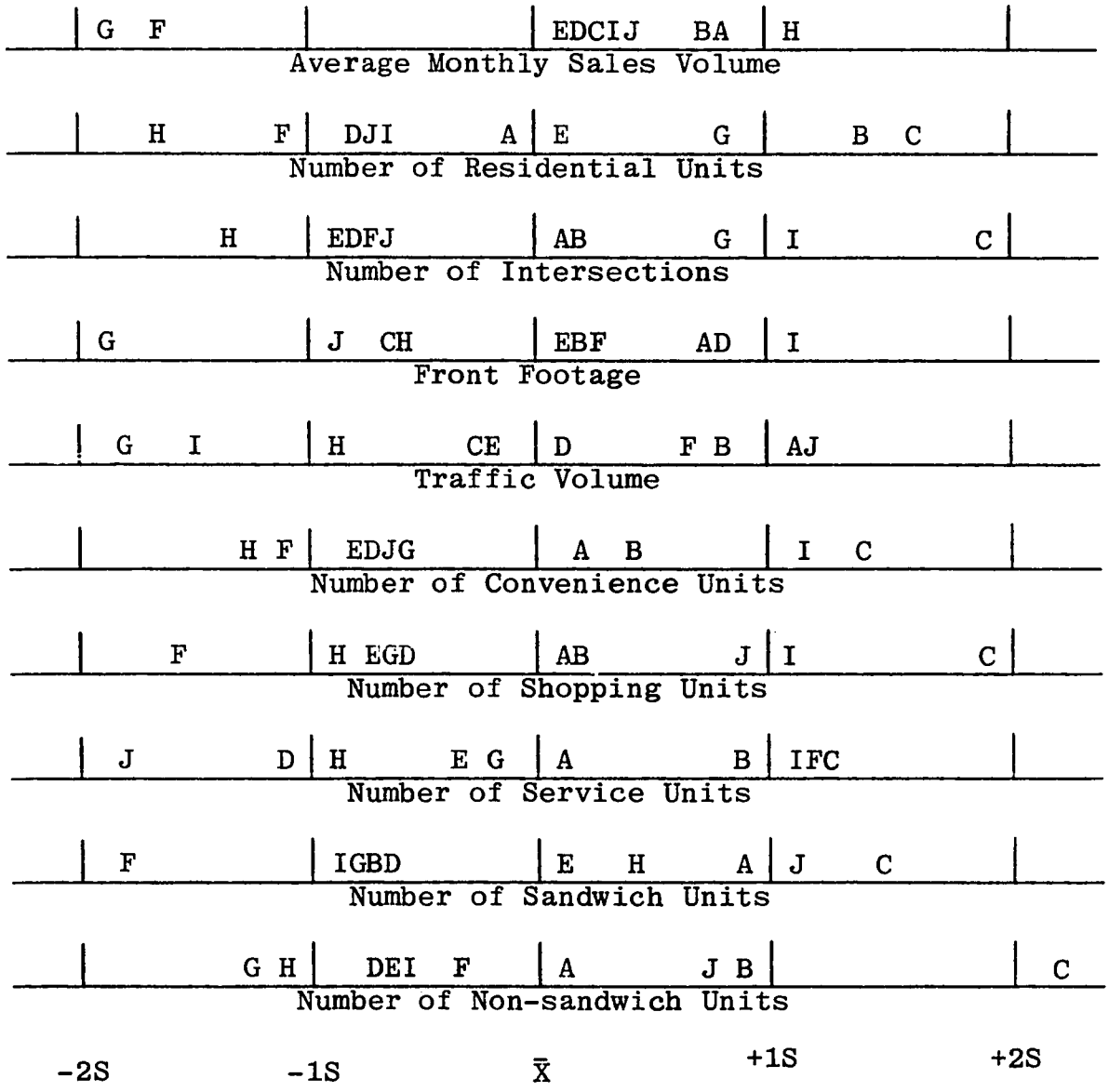
Measurement of Relative Location Variables

Variable	No. of Residential Units	No. of Intersections	Front Footage	Daily Traffic Volume	No. of Convenience Units	No. of Shopping Units	No. of Service Units	No. of Sandwich Units	No. of Non Sandwich Units
Site									
A	3001	203	190	22595	70	43	131	11	14
B	4252	206	170	21591	79	45	159	6	19
C	4593	312	140	16445	103	86	171	13	28
D	2480	145	190	18689	51	33	79	6	9
E	3095	136	160	16817	46	25	102	8	10
F	2061	152	170	20944	35	10	168	3	12
G	3782	263	90	8924	55	30	113	6	6
H	1711	117	142	12972	30	22	93	9	7
I	2789	290	210	11060	92	72	165	5	11
J	2733	158	130	23373	52	58	56	11	18
$\bar{X}$	3050	198	159	17341	61	42	123	7	13
o	920	69	35	5025	24	23	41	3	6

SOURCE: Compiled by author from field observations

FIGURE 7

Dispersional Characteristics of the Relative Location Variables and Average Monthly Sales Volume, by Sites A-J



SOURCE: Author's computations

around the site appears to be well balanced between residential, industrial, and commercial activities.

Site A generates a sales volume which is almost one standard deviation above the mean. The dispersion pattern of Site A for seven of the variables is similar; that is, Site A tends to fall between the mean and plus one standard deviation. The exceptions are the number of residential units and the daily traffic volume. In the former case, Site A falls slightly below the mean; in the latter case, Site A falls slightly above one standard deviation. It would appear that Site A has an above-average potential for customer interaction and should be expected to produce a sales volume greater than the central tendency.

Site B. Located at the intersection of two principal commercial streets of a major city, Site B has the advantages of a corner position. The character of the commercial streets can best be described as intermittent convenience goods establishments. A community shopping center is located across the street and there are several small neighborhood shopping centers[8] within a short driving distance. While the principal arteries are commercial, the predominant land use is middle-income residential.

The dispersional characteristics of Site B's relative location characteristics are best described by the interval

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[8]For a description of regional, community, and neighborhood shopping centers, see Gist, Ronald; Retailing: Decisions and Concepts, Chapter 3.

from the mean to plus one standard deviation. As should be expected from the visual inspection, the number of residential units lies above plus one standard deviation. Because of the convenience nature of the principal streets, it is somewhat surprising that the number of sandwich units (a convenience goods establishment) is below the average. Considering the overall balance in the intensity of land use, it is not surprising that Site B has the third highest average monthly sales volume.

Site C. Site C is situated within a densely populated area of a major city. The site is located on the corner of a principal four-lane street and a secondary residential street. The principal artery is characterized by intermittent convenience goods stores. However, within a quarter-mile driving distance there is another commercial street which has an extremely dense population of service and shopping goods units. In addition, a large regional shopping center is located about three-quarters of a mile west on the principal artery. One additional generator of potential customers is a major city university located approximately a quarter-mile away.

In seven out of the nine relative location variables, Site C is located in the standard deviation interval of plus one to plus two; that is, it has the greatest number of residential and commercial units. It is, therefore, somewhat surprising that Site C ranks sixth in average monthly sales volume. This ranking could be explained in part by the fact

that Site C is below the mean in site exposure (as measured by front footage) and daily traffic volume. The fact that Site C's daily traffic volume is found within the minus one standard deviation to mean interval is also unexpected, considering the potential for interaction. One possible explanation could be congestion. Another explanation is that there are several other major traffic arteries within the site's primary trade area, and these tend to have a high traffic volume. Also, there is considerable difficulty in gaining access from these major arteries to the site's principal artery. One final explanation for the sales volume is indirect competition afforded by the number of sandwich and non-sandwich units.

Site D. Site D is located on a principal access highway to a major military installation. In addition, it is located within a residential suburb. The commercial structure around the site consists of (1) a small suburban C.B.D., (2) several small neighborhood shopping centers, and (3) a convenience goods ribbon which is characterized by large lots with considerable visual exposure. While the immediate area has several large planned residential areas, there are also numerous large vacant areas awaiting development.

Site D falls below the mean for seven of the nine variable categories. The number of commercial and residential units are all below the central tendency, while the daily traffic volume and the front footage exposure are slightly

above the average. The sales volume record (7th) appears to be appropriate to relative location measurements.

Site E. Like Site D, Site E is also located on a principal access road to a major military installation. While Site E is located at the intermediate point between two community shopping centers, the direct cumulative attraction factor is reduced by the distance between the site and the shopping clusters. The transportation artery on which Site E is located can be described as dispersed linear clusters of convenience goods stores. Planned residential areas and scattered vacant areas predominate in the land-use scheme.

The average sales volume of Site E is slightly above the mean. It should be noted, however, that this position is probably due to the negative skewed character of the sales volume distribution. Site E is within one standard deviation of the mean for all nine relative location variables. There are several notable negative deviations; they are the number of intersections, the number of convenience units, the number of shopping units, and the number of non-sandwich units. Considering the predominantly negative character of the dispersion, the sales volume ranking of eighth should probably be expected.

Site F. Commercial land use characterizes the environment of Site F. Located in a commercial district of a major city, Site F is situated on a six-lane highway leading to a major governmental office complex. The commercial activities

along the traffic artery are primarily composed of office complexes and professional service centers. Residential units are few and could be referred to as low-income minority housing. Both convenience goods and shopping goods retailing establishments are limited.

The dispersion characteristics of Site F for the nine relation location variables show considerable variation. Positive deviations include front footage, traffic volume, and number of service units. The largest negative deviations include the number of residential units, the number of convenience goods units, the number of shopping goods units, and the number of sandwich units. One possible explanation of the low sales volume (almost a minus two standard deviations) is the unbalanced nature of Site F's relative environment. The environmental qualities of Site F would appear to promote a large luncheon trade; however, it lacks those qualities necessary for a volume business at the dinner hour period.

Site G. Site G is located in a suburban residential area. While the site is situated on a four-lane street, the artery would have to be considered a secondary route in the total transportation network of the area. There are two shopping clusters located at the fringe of the site's primary trading area; however, the distance between the clusters and Site G prevent a strong cumulative attraction effect. One additional factor could be important. The residential area contained within the primary trading area ranges from areas

of low family income to one of the most exclusive suburbs in the city. Both the upper and lower poles of this range would not be likely customers of the case study firm.

Measurements of the relative location variables for Site G all tend to fall on the negative end of the dispersion distribution, with the exception of the number of intersections and the number of residential units. Considering the negative dispersion and the above comments concerning the residential areas, it is hardly surprising to find that Site G has the lowest average monthly sales volume of all base model sites.

Site H. Site H is located in a middle-sized city[9] whose primary economic activity is a major petroleum refinery. In addition, the city is the regional commercial hub for the surrounding agricultural community. Situated on the periphery of the city, Site H enjoys the advantage of being located on one of the city's major access highways.

The land-use complexion of the primary trading area consists of some small residential areas, relatively small commercial areas, and a considerable amount of vacant land. Outside of some limited commercial strip developments, the only major retail cluster within a mile is a community shopping center directly across from this site.

Site H provides the major discrepancy in the base model. The position of Site H's relative location measurements (all

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[9]Middle-size city is taken to mean a population of 25,000 to 100,000.

but one are negative positions) on the dispersion scale suggests that the sales volume potential of Site H is limited. This is not the case. Site H has the highest actual sales volume. Visual inspection of the primary trading area gives no clue to an explanation for this discrepancy.

Site I. A city of less than 20,000 people provides the market setting for Site I. Located on the principal traffic artery of the city, Site I enjoys the advantage of being situated within a short distance of the city's C.B.D. As would be expected, the traffic artery fronts a host of retail and service establishments. Site I would appear to enjoy additional advantages in that it has great exposure with a lot that has a frontage of more than 200 feet and with the adjacent lot being vacant. Also, Site I has a corner block position.

The dispersion characteristics of Site I's relative location variables are both negative and positive. The number of residential units, sandwich units, non-sandwich units, and traffic volume all fall below the mean. The remaining five variable measurements all lie above the mean. Site I ranks fifth in sales volume, and given the dispersion characteristics above, this should be expected.

Site J. The general setting of Site J is a city of about 60,000 whose principal economic activity is a large military base. Site J is located on a major highway that is abutted densely with commercial clusters. There are two

community shopping centers, supported by several neighborhood shopping centers, as well as numerous linear commercial clusters. While the site has an interior block position, it does have access via alley to several secondary streets.

Site J records above-average measurements for four of the nine variables. Most notable of the positive positions are daily traffic volume and the number of sandwich units. Shopping unit measurements also show a significant difference from the mean. Out of the five negative positions, the number of service units and front footage are the most conspicuous. Judging from the rather diverse character of Site J's environment, the sales volume ranking of fourth might be a little unexpected.

Analysis of Interdependence

The third, fourth, and fifth steps of the base model all deal with the analysis of interdependence. The third step, principal component factor analysis, is concerned with delineating the most general patterns of relationships (unrotated factors) in the data (measurements of relative location). Because these most general relationships patterns are difficult to interpret, Step 4 (orthogonal rotation) is initiated. The rotated factors delineate the distinct clusters of relationships in the data.[10] The problems of interpretation are

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[10]For a good discussion on the distinction between unrotated and rotated factors, see R. J. Rummel, "Understanding Factor Analysis," The Journal of Conflict Resolution, Vol. XI, No. 4, 1967, pp. 472-477.

considerably less for distinct clusters than for the general patterns of the unrotated matrix. Once the rotated factors have been established, weights are calculated for each factor. These weights are the factor scores for each factored dimension for all cases (sites). The calculation of factor scores constitutes the fifth step in the base model.

The rotated factor loadings of the relative location variables are given in Table 7. The three factored dimensions or patterns are identified as: (1) an opportunity dimension, (2) an attraction dimension, and (3) an exposure dimension. The interpretation and naming of each of the above dimensions is based on the factor loadings (the degree of involvement of each variable in each dimension) and the factor scores. Factor scores on each dimension for each case (site) are given in Table 8 and illustrated in Figures 8a, 8b, and 8c.

The Opportunity Dimension. The opportunity dimension shows a high positive loading on the number of convenience units (.96) and the number of intersections (.91). Relatively high loadings for the opportunity factor occur for the number of shopping units (.88), the number of residential units (.83), and the number of non-sandwich units (.75). The number of service units (.58) and the number of sandwich units (.41) are also shown on the first dimension.

The complexity of the loadings on the first factor creates difficulties in its interpretation. The term "opportunity" was selected because it was broad enough to

TABLE 7

Rotated[1] Factor Loadings of the
Relative Location Variable
for Base Model Sites

Variables	Dimensions or Factors: Opportunity I	Attraction II	Exposure III	
1. Residential Units	.83			
2. Intersections	.91			
3. Front Footage			.88	
4. Traffic Volume		.91		
5. Convenience Units	.96			
6. Shopping Units	.88			
7. Service Units	.68		.53	
8. Sandwich Units	.41	.61		
9. Non-Sandwich Units	.75	.57		
Per Cent Total Variance	48	20	17	85[2]

SOURCE: Author's computation

[1]The unrotated factor loadings were rotated in an orthogonal fashion.

[2]Total per cent of variation among all the variables (1-9) involved in the patterns (factors 1, 2, 3).

TABLE 8

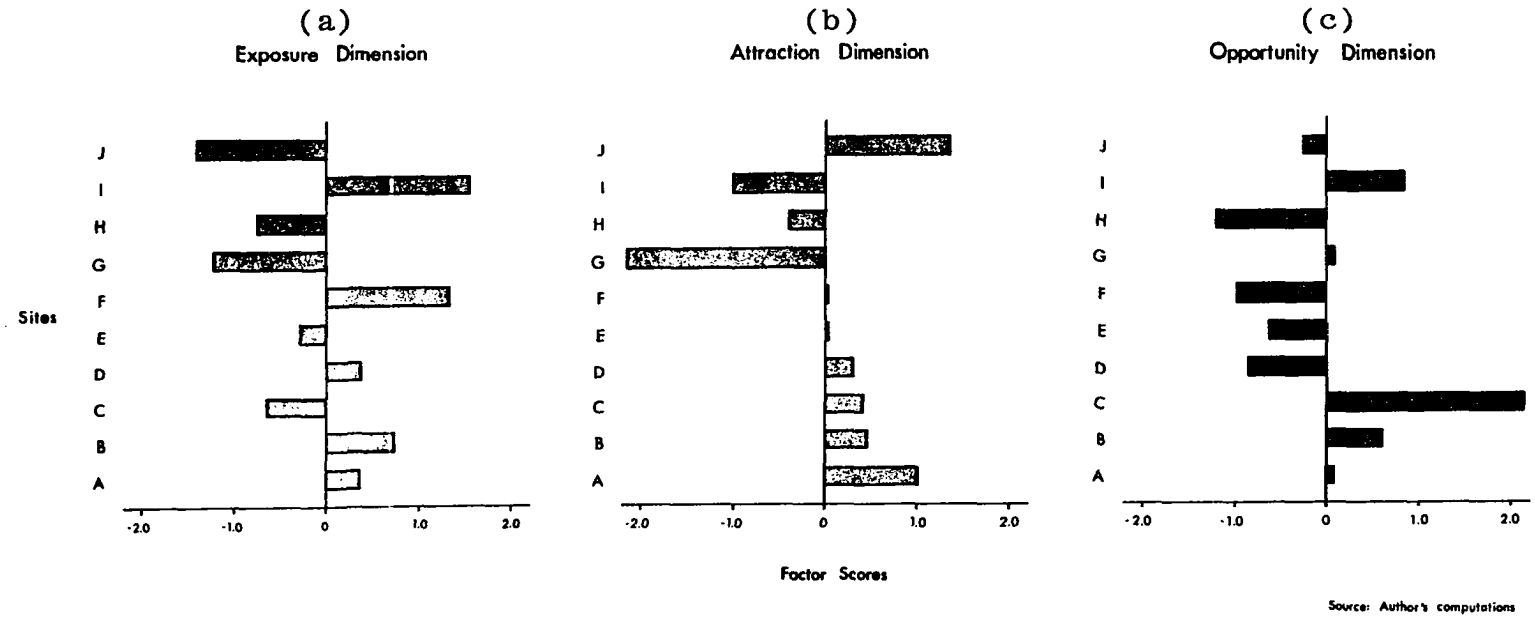
Factor Scores on Factor Dimensions
for Sites A-J

Sites	Dimensions		
	Opportunity	Attraction	Exposure
A	0.12	1.03	0.34
B	0.61	0.45	0.69
C	2.13	0.38	-0.63
D	-0.82	0.31	0.37
E	-0.62	0.03	-0.27
F	-0.96	0.01	1.29
G	0.11	-2.13	-1.21
H	-1.17	-0.13	-0.71
I	0.81	-0.39	1.52
J	-0.23	1.34	-1.37

SOURCE: Author's computation

FIGURE 8

Factor Scores on Factor Dimensions by Site



Source: Author's computations

encompass the range of relative location variables that entered into the dimension, and yet it suggests a combination of circumstances favorable for interaction. In this case, the circumstances are the intensity and variety of land use and the interaction is the potential site-customer interaction. The dimension encompasses the principles of generative and suscipient location, that is, respectively, the attraction of the consumer directly from his place of residence and the coincidental attraction of the consumer while away from his place of residence. The opportunity factor also incorporates the principle of interception. The greater the number and variety of potential units of interaction, the greater the possibilities for interception of the interactors. The principle of store association and the opportunity factor are compatible. The variety of associations represented in the first factor are conducive to the potential spatial interaction of site and consumer.

An examination of the factor scores on the base model sites tends to lend credence to the selection of the term "opportunity." Sites A, C, and I are all located in areas of relatively high land-use intensity. This is particularly apparent in the case of Site C. Most assuredly, the actual interaction and the potential opportunity for interaction is greater at these sites in comparison to the remaining sites. Sites A, G, and J are rather neutral with respect to the opportunity factor; that is while the intensity of one or more of the variables is high, they also show low measurement

magnitudes on one or more variables. Located in neighborhoods of a dispersed character, Sites D, E, F, and H all lack the intensity and/or variety of land uses necessary for positive weighting on the opportunity factor.

The Attraction Dimension. Three variables load on the attraction dimension. Daily traffic volume exhibits the highest loading (.91), while the number of sandwich (.61) and non-sandwich (.57) units show a significant loading.

The relatively simple structure of the attraction dimension would appear to make interpretation easier; however, this is not the case. As was stated in Chapter V, traffic volume is the most versatile of the variables selected. It could and does represent several locational principles. Its association, however, with the number of sandwich and non-sandwich units suggests the meaning of cumulative attraction. Indirectly, traffic volume measures the consumer potential of an area in terms of its ability to attract potential consumers into the area. The association of eating establishments with volume of traffic suggests the cumulative attraction which accrues to areas containing "like" establishments.

The positive factor scores on Site A and J and the negative weights associated with Sites G and I strengthen the argument of cumulative attraction of "like" establishments. Sites A and J are located on transportation arteries which not only have a high traffic flow, but have a noticeably large number of franchise and local eating establishments. In both

cases, the traffic arteries associated with Sites A and J would most assuredly typify the expression "restaurant alley." On the other hand, Sites G and I are associated with a traffic artery that has neither a high volume nor a noticeable number of eating establishments.

The Exposure Dimension. The last dimension consists primarily of one major positive loading--front footage (.88). The number of service units also shows a positive loading (.53) on the exposure dimension.

The term "exposure" was chosen as being descriptive of the dimension because front footage expresses the visual accessibility (exposure) of a site. The explanation of the positive showing of the service variable is that several of the service units occupy large exposed sites. For example, various construction establishments, utility service units, and auto repair units. This is particularly true of Site F. The factor scores for each site confirm the meaning of exposure.

Average Monthly Sales Volume

The average monthly sales volume is the dependent variable in the dependency analysis. This variable was furnished by the case study firm for all base model sites. The sales volume data represent the site average for a 12-month period starting July, 1971, and ending June, 1973. This particular time period was selected because (1) it represented

the only time frame in which the sales volume data are common to all sites in both the base and estimation models, and (2) it represented the time frame in which the relative location measurements were made. This latter point is important because the site evaluation model estimates a site's place value at a point in time. It does not purport to estimate the site's worth during some past period or some future time. It is the site's present environment that determines its present place utility; therefore, the time of the relative location and sales volume measurements should be a common period.

The average monthly sales volumes are given in Table 9 and illustrated in Figures 9a and 9b. In order to maintain the confidential records of the case study firm, the original values were divided by a constant. Figure 9a illustrates the sales record for each base model site. Three sites, A, B, and H all have average sales volumes which are above the mean for the base model. Sites F and G have performances far below the mean, while Sites C, D, E, I, and J tend to cluster around the mean. (The dispersional characteristics of the sales volume data and its association with the various base model sites has already been discussed in the section entitled "Relative Location Variables.")

Figure 9b illustrates the sales record for all model sites by each month of the time period. March, April, and May all tend to be the mean. Overall, the monthly dispersion in sales volume is not drastic; as a matter of fact, the

TABLE 9

Average Monthly Sales Volume
July, 1972 - June, 1973

BASE MODEL SITES

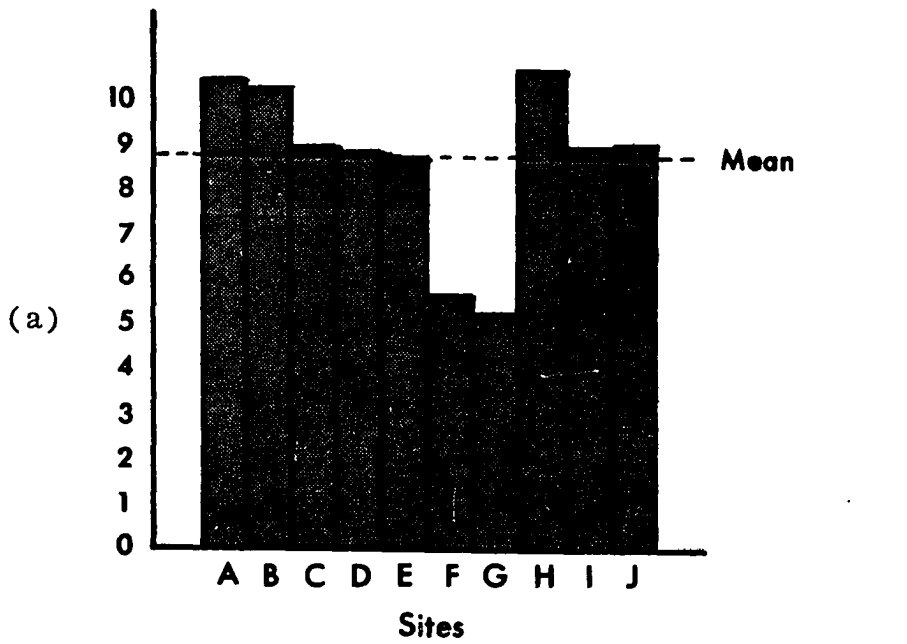
1972-1973	A	B	C	D	E	F	G	H	I	J	Mean
July	11.40	9.75	8.69	8.80	7.15	6.35	4.43	10.92	9.55	9.61	8.67
August	11.59	10.02	8.96	8.57	7.65	6.33	4.65	10.37	9.40	9.17	8.67
September	11.45	10.04	8.77	8.57	8.00	5.44	4.75	9.60	9.09	8.36	8.41
October	10.23	9.18	8.46	7.80	7.74	5.66	4.37	9.70	8.71	8.29	8.01
November	8.76	8.31	7.74	7.18	7.12	4.53	4.02	8.96	7.75	7.47	7.18
December	10.23	10.36	8.87	8.63	8.97	4.98	4.70	10.23	8.50	8.01	8.35
January	8.99	9.40	8.14	8.14	8.39	5.14	4.47	8.60	8.04	7.32	7.66
February	9.53	9.43	8.30	8.16	8.38	5.13	5.93	10.20	7.94	7.88	8.09
March	11.40	11.09	9.65	9.93	10.21	5.75	7.34	11.32	9.00	9.86	9.56
April	9.96	10.23	8.98	9.38	9.58	5.72	5.35	11.47	9.26	11.17	9.11
May	10.40	11.12	9.14	9.94	10.14	6.17	5.90	12.43	9.46	10.15	9.49
June	9.48	11.04	9.30	9.65	9.83	6.01	5.52	11.51	8.63	9.39	9.04
Mean	10.28	10.00	8.75	8.73	8.60	5.60	5.12	10.44	8.78	8.89	8.62

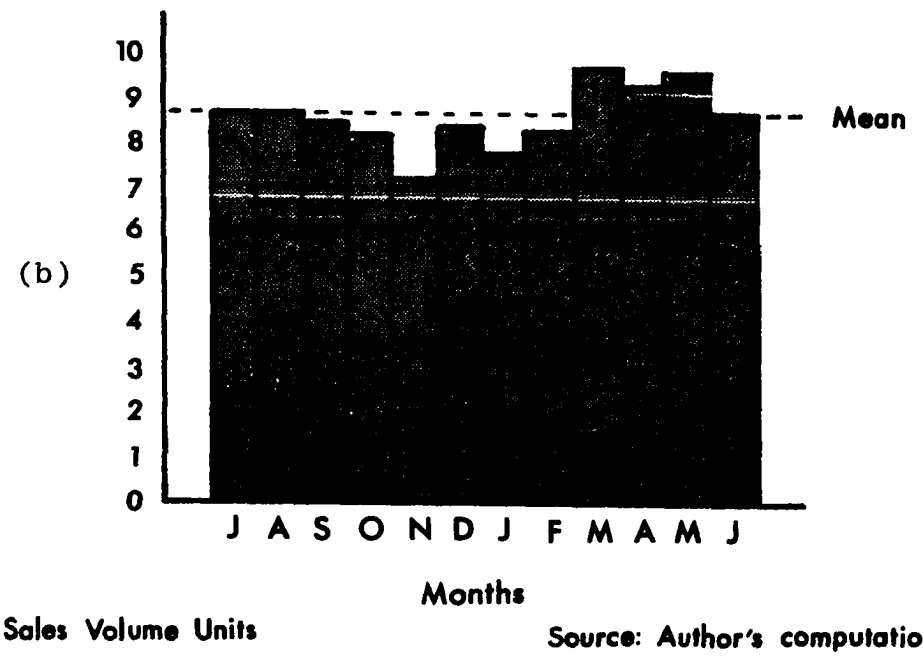
SOURCE: Vice President of Operations, Case Study Firm

FIGURE 9

Base Model

Average Monthly Sales Volume July 1972 - June 1973





Sales Volume Units

Source: Author's computations

seasonal character is appropriate to the dining out characteristics of the south-central consumer.

One further point needs to be made concerning average monthly sales volume as the dependent variable. The site evaluation model purports to estimate this dependent variable on the basis of its relative location characteristics. It can be argued that site-to-site variation in sales volume is a function of several variables other than location. The most significant of these variables is usually referred to as the elements of the retailing mix. Pricing structure, promotional strategy, product mix, and service offering are all variables which could influence the between site variation in sales volume. This is not the case, however, for the company management maintains a strict policy of store-to-store consistency in these elements. Considerable effort is made by central management through regional and district coordinators to insure the uniformity that is so critical to a chain organization. It is therefore assumed, for the purpose of the site evaluation model, that the above elements have no significant influence in the site-to-site variations in sales volume. Considerable field observation by this researcher has tended to verify this assumption.

There remain four additional factors which might have a significant influence on the site-to-site variation in sales volume. They are: (1) the local variation in store management, (2) the local variation in socio-economic conditions,

(3) the local variation in consumer behavior, and (4) the local variation in the actual size of the primary trading area.

The local store manager can be an important key to the sales volume success of the store under his control. The manager's ability to promote business through local public relations is a factor known to influence sales volume. In addition, the manager's ability to provide the consumer with a product-service quality which is consistent can also influence the volume of sales through the promotion of return trade. These managerial abilities do vary from site to site.

Socio-economic conditions will demonstrate variation from site to site. Income and employment levels, ethnic and racial composition, age and family profiles, and the economic growth rate of the area are all possible factors which could influence a site's sales volume.

Variation in consumer behavior from one trading area to another is the third factor influencing sales volume. Essentially, consumer behavior is closely associated with socio-economic conditions. The principal difference is that the latter is concerned with the ability of a consumer to patronize a particular type of retail establishment, while the former deals with factors which influence a consumer's willingness to patronize the same establishment. Trading areas show considerable variation in consumer behavior in the following ways: (1) the propensity to dine out, (2) the willingness to travel various distances in order to dine out, (3) the criteria for selecting an eating establishment, (4) the willingness to

patronize a franchised (outside) business, and (5) the reception of various types of product and service mixes.

The actual size of the primary trading area will vary from site to site. In areas of dense population and intense land use (large urban areas) the required trade area size may be small. In smaller cities (where population and land use intensities are limited) a much larger trade area may be required in order to support a particular type of retail outlet. This variation in trade area size might account for some of the site to site variation in sales volume.

The site evaluation model does not control for management, socio-economic conditions, consumer behavior, or trade area size. While site to site discrepancies were observed, these were not entered into the model. It is thought that these three factors will be a major consideration in the analysis of residuals. Individually, the absolute residuals could be considered a pooled measurement of the site to site variations in management, socio-economic conditions, consumer behavior, trade area size, measurement error, and sampling error. This is especially true when all other explanations have been logically ruled out.

Analysis of Dependence

The last two steps in the base model are concerned with the analysis of dependence between the average monthly sales volume and the variables of relative location (as represented by the factor scores). The dependence analysis is accomplished

by use of a multiple stepwise regression program.[11] The results of that regression analysis were about as expected. The coefficient of multiple correlation (R) between the factored dimensions and the average monthly sales volume is .58, thereby, giving a 34 per cent explained variance (R^2). The entrance order of the stepwise procedure is (1) the attraction dimension, and (2) the opportunity dimension. The exposure dimension was not entered; its contributions to the explained variance is insufficient for inclusion.

The "R" value of .58, with the corresponding "R^2" value of .34, indicates a rather moderate relationship between the proposed dependent and independent variables. These low values, however, should be expected. With the limited number of cases and, therefore, the limitation on the number of dependent variables, it is not surprising that the total variance in the sales volume data is not accounted for in its entirety. In simple fact, more variables are needed in order to fully explain the relationship between location and sales volume. An analysis of the absolute residuals might suggest additional variables which could be included in the analysis to increase the known relationship of .58. The absolute residuals are given in Table 10.

Site F shows the largest absolute residual (-2.75); in other words, the model overestimated by about one-third. This

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[11]The stepwise procedure was used in order to obtain the additional information of variable entrance order. It should be noted, however, that multiple regression, without the stepwise procedure, would be sufficient.

TABLE 10

Absolute Residuals
Sites A-J

Site	Known Y	Computed Y	Residual (Y-Yc)
A	10.29	9.61	0.68
B	10.00	9.10	0.90
C	8.75	9.31	-0.56
D	8.73	8.68	0.05
E	8.60	8.43	0.17
F	5.60	8.35	-2.75
G	5.12	6.34	-1.22
H	10.44	7.90	2.54
I	8.78	7.61	1.17
J	8.89	9.86	- .97

SOURCE: Author's computation

large discrepancy is most likely due to the highly skewed character of the daily sales volume. The luncheon trade makes up more than 70 per cent of the total daily sales volume, while the dinner trade accounts for less than 20 per cent. The luncheon trade is comprised of individuals who work in one of the many office complexes within the primary trading area. The dinner trade is comprised of individuals who are either residing in one of the transient residential units (motels) or in one of the permanent residential units within the primary trading area. It is this latter group that offers a reasonable explanation for the residual. The residential areas of Site F are low income-minority areas. The socio-economic characteristics of these residential areas are such that they do not provide the necessary conditions for a high degree of interaction between Site F and the residential areas. In the case of Site F, the inclusion of certain socio-economic variables might be justified.

The second largest residual (2.54) is associated with Site H. In this case, the model has underestimated the actual sales value. One possible explanation of this residual is the management factor. In this case, the local store manager is a well-known, long-time resident of the city. He has been able to attract various service clubs (Lions, Jaycees, etc.) to hold their weekly meetings in the store annex. In addition, he has generated a considerable monthly volume by attracting private parties. For example, wedding parties, professional conferences and various award banquets. These activities are

a satisfactory explanation for the discrepancies between estimated and actual sales volumes. While all the local managers tend to engage in this activity, the manager of Site H is visually more successful at these activities.

Site G represents the third largest discrepancy between actual and estimated sales volume (-1.22). As was the case with Site F, socio-economic variables offer one explanation for the large residual. Site G is located in an area where the residential areas can be classified as either low income or high income. In either case, the residents of these areas do not patronize the type of eating establishment outlined in this research.[12] Measures of income level, family size, and employment classification might all serve as valuable additions to the model's incorporated variables.

Consumer behavior variables might also serve to explain the residual associated with Site G. Such consumer behavior variables as the criteria used in selecting eating establishments and the acceptability of certain types of product-service mixes could account for the low rate of patronage generated from the high income areas associated with Site G. The propensity to dine out is a consumer behavior variable that could account for the low rate of patronage generated from low income, large family residential areas.

The above discussion covers the major residuals. Management explanations are appropriate for Sites A, B, and I.

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[12]This observation was verified by interviews with the past two store managers of Site G.

In each case, the local store manager is aggressive in his attempts to generate business. The aggressive behavior ranges from promoting a high group volume in the store annex to personal selling directed toward the drop-in customer. Personal selling is an attempt by the manager to build a high return trade. The explanation for the overestimate of Site J (-.97) is not apparent. The management and the socio-economic conditions of the site give no clue as to the overestimate. The only possible explanation is consumer behavior, however, the exact traits are not apparent.

The Estimation Model

There are nine operational steps necessary for the implementation of the estimation model. These steps have already been outlined in Figure 6 and Table 4. The estimation model is essentially an iterative procedure. It is an iteration of the procedures used in the base model[13] with one additional site being added with each iteration. As stated earlier, the primary purpose of the estimation model is to estimate the average monthly sales volume for new additional sites when that volume is unknown. Five sites are included in the model; they are K, L, M, N, and O. The following discussion is concerned with the results of the model's implementation.

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[13]There are some procedural deviations from the base model. These will be discussed at the appropriate time.

Primary Trading Area

As was the case in the base model, the first step of the estimation model is to determine the primary trading area. This has already been determined for the base model, and that trading area is also used in the estimation model. The primary trading area is defined as distance class 0 - .99.[14]

Relative Location Variables

Table 11 presents the measurements of the relative location variables for Sites K-O. The dispersional characteristics of the measurements are illustrated in Figure 10 along with the sales volume dispersions. Variable measurements are discussed for each site in conjunction with a general subjective description of the site's locational character.

Site K. Site K is located on the fringe of a large community shopping center within a city of about 40,000 people. The shopping center itself is located on the outskirts of the city. While the immediate environment around the site is rather densely populated with commercial activities, the site's primary trading area is rather sparsely populated. Theoretically, the site has the potential to draw from a major highway; however, the access difficulties limit this potential

[14]It should be noted that the appropriate distance class could change over time or from one marketing region to another. The process of delineating the primary trading area should be repeated periodically as a safeguard against changing site-environment relationships.

TABLE 11

Measurements of Relative Location Variables

Variable	No. of Residential Units	No. of Intersections	Front Footage	Daily Traffic Volume	No. of Convenience Units	No. of Shopping Units	No. of Service Units	No. of Sandwich Units	No. of Non Sandwich Units
Site									
$\bar{X}$ *	3050	198	159	17341	61	42	123	7	13
K	644	98	120	9330	39	20	39	3	13
L	1009	87	120	6400	24	23	29	3	5
M	1253	92	125	16479	39	30	103	7	13
N	1720	83	110	10000	39	22	47	3	4
O	1896	142	100	14580	67	37	162	8	12
$\bar{X}$ **	2467	165	144	15346	54	37	107	6	12
S ***	1160	74	35	5436	23	20	50	3	6

SOURCE: Compiled by author from field observation

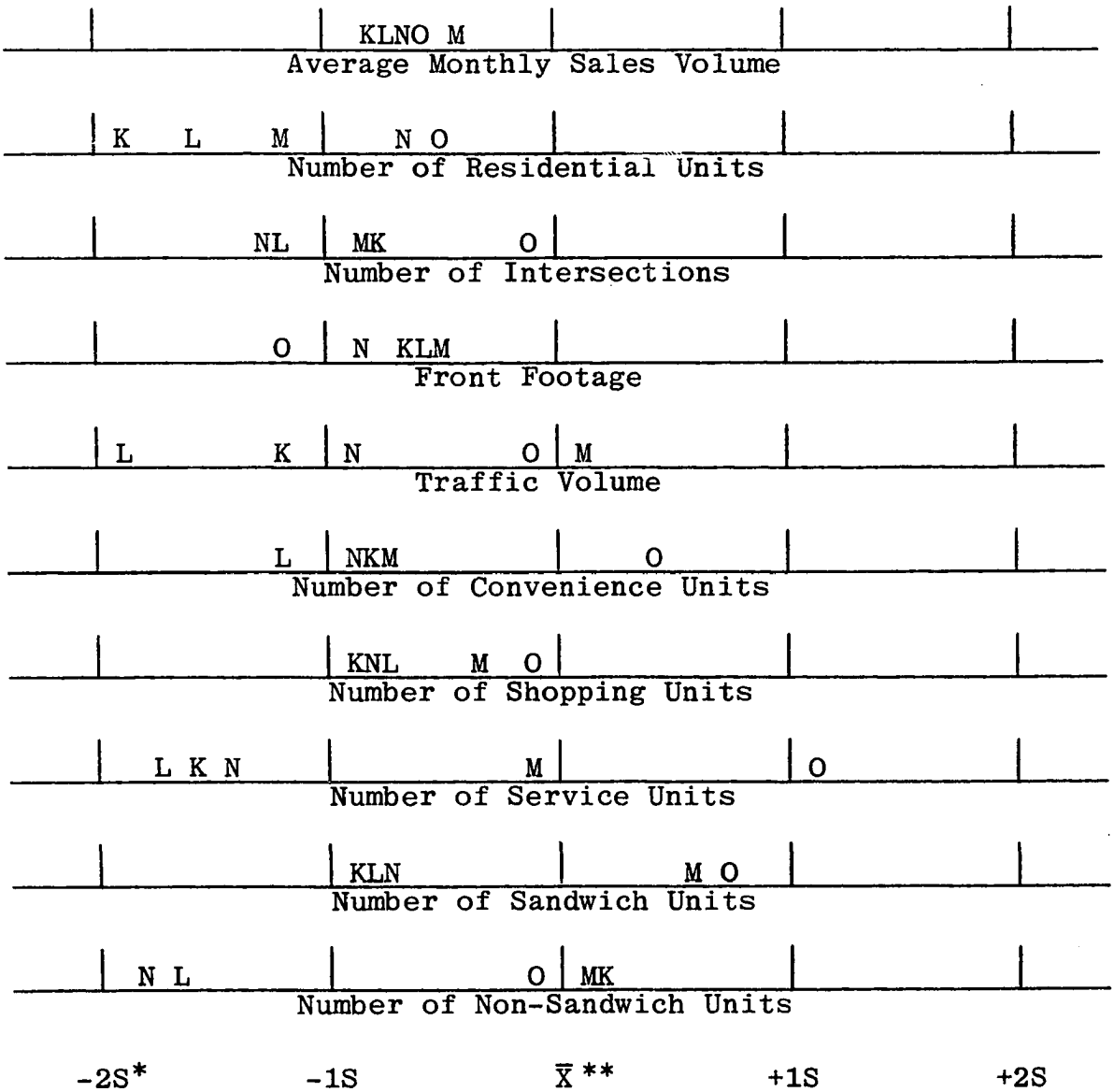
*The mean values for "base model" sites

**Mean value

***Standard deviation

FIGURE 10

Dispersonal Characteristics of the Relative Location Variables and Average Monthly Sales Volume, by Sites K-O



SOURCE: Author's computation

*S is standard deviation
**$\bar{X}$ is mean of each variable

extremely. The overall visual picture of the site's environment is noticeably limited.

In terms of dispersional characteristics of the location variables, Site K lies below the mean in all cases except the number of non-sandwich units. The most noted departures from the mean occur with respect to the number of residential units and traffic volume. In both cases, Site K lies more than one standard deviation below the central tendency. Considering the negative dispersion characteristics of Site K's environment, the negative standard deviation of the sales volume is appropriate.

Site L. The environment of Site L is primarily residential and vacant. Located on the edge of a middle-sized city whose principal economic activity is a military base, the site appears to lack the necessary environmental qualities to generate a high level of interactions between the site and its environment. While Site L is located on one of the major access highways, its fringe position does not allow the site to take full advantage of the greater traffic volume generated within the city itself.

Site L falls between a minus one and a minus two standard deviation in six of nine variable classes. In the remaining three variable classes, namely front footage, number of shopping units, and the number of sandwich units, Site L lies between the mean and a minus one standard deviation. The negative dispersion characteristics result in the expected

negative dispersion of the sales volume data, that is, a sales volume that is almost a standard deviation below the mean.

Site M. The positional qualities of Site M within a developing environment suggest considerable potential growth. The development of new commercial and residential areas within the primary trading area should be sufficient to generate the needed spatial interaction for a high-volume site. For the present, however, the imbalance in the site's environmental land use, (about a 3-to-1 commercial to residential ratio) appears to limit the site's present potential for interaction. This unbalanced character could be extended into the future with a faster development of more commercial than residential areas. Nevertheless, being located on the major traffic artery between the city's C.B.D. and a large regional shopping center, the site offers considerable potential.

Site M tends to cluster within one standard deviation of the mean for all relative location variables except the number of residential units, which falls below a minus one standard deviation. In traffic volume, and in the number of sandwich and non-sandwich units, Site M lies above the mean. In the variables measurements of the number of intersections, front footage, number of convenience, shopping and service units, Site M lies slightly below the mean. The general central tendency character of Site M results in a sales volume dispersion which is also near the mean, more specifically, slightly below the mean.

Site N. The location on a service road adjacent to an interstate highway creates both environmental advantages and disadvantages. The advantages are obvious. The theoretical potential of the site to interact with the traffic flow on the interstate highway is good. This interaction, however, is tempered by the rather poor physical and visual accessibility of the site to that flowage. The low elevation (below the level of the highway) forces the use of other promotional devices (elevated signs) other than the visual characteristics of the site and building. The poor physical accessibility of the site with respect to the interstate system lies in the fact that the site lies between the two limited access points of the highway. The environmental disadvantages of the interstate system are that it acts as an absolute barrier to the spatial interaction of the site and the environment which lies on the other side of the highway. Site N's immediate environment consists primarily of residential units. As a matter of fact, Site N is located in what is termed as a "bedroom" city. There is a very limited number of commercial units in the adjacent environment. The commercial clusters that are in the site's trading area are located on its fringe.

Site N falls below the average occurrence for all the relative location variables. The number of intersections, the number of service units, and the number of non-sandwich units are all below a minus one standard deviation. The remaining variables are found between a minus one standard

deviation and the central tendency. The below average sales volume record is expected.

Site O. The relative environment of Site O exhibits a rather balanced character between residential and commercial activities. Located on the principal access highway to the C.B.D. of a large suburb, Site O is found in association with a ribbon of convenience goods establishments. The fringe of the site's primary trading area contains the C.B.D. and a major state university. Visually, the site appears to be one which is capable of generating a relatively high sales volume. The most serious visual handicap is the limited size of the lot and its limited visual exposure.

Front footage and the number of service units are the only two variables which do not fall in the interval of a plus or minus one standard deviation. In the former case, Site O falls far below the mean, while in the latter case, Site O is greater than plus one standard deviation. The clustering of the values around the mean appears to be an adequate explanation of the near average sales volume.

Analysis of Interdependence

The operational procedures used in the analysis of interdependence are discussed in Table 4. The reader is referred to Steps 3, 4, and 5 of that discussion.

The rotated factor loadings of the relative location variables for each iteration of the estimation model are

illustrated in Table 12 for the opportunity dimension; in Table 13 for the attraction dimension, and in Table 14 for the exposure dimension. The opportunity dimension has basically the same pattern for each of the iterations, and it is the same pattern as was factored out in the base model. While the relative strength of the various loadings has been somewhat altered from the base model, these adjustments have not been sufficient enough to alter the meaning of the opportunity dimension.

The attraction dimension has experienced some noticeable adjustments in the relative loadings of the traffic variables and the variables of number of sandwich and non-sandwich units. The former variables' contribution to the pattern is substantially less than it was in the base model, while the latter two variables have contributed more to attraction dimension. The name "attraction," however, is still appropriate. In the interpretation of the attraction factor, a stronger emphasis should be placed on the cumulative attraction of "like" establishments. The relative low loadings of the residential and shopping unit variables are not that influential and are considered compatible with the concept of cumulative attraction.

The addition of the variable-daily traffic volume to the exposure dimension requires a broad interpretation of that dimension. The exposure dimension refers not only to visual exposure but also to physical exposure, in the sense of direct accessibility to the site.

TABLE 12

Rotated[1] Factor Loadings on the Opportunity Dimension of the Relative Location Variables for Base Model Sites Plus Estimation Model Sites

		Opportunity Dimension				
	Sites	A-K	A-L	A-M	A-N	A-O
	Variables					
1	Residential Units	.74	.75	.77	.77	.76
2	Intersections	.97	.97	.97	.95	.95
3	Front Footage					
4	Traffic Volume					
5	Convenience Units	.91	.90	.91	.91	.91
6	Shopping Units	.77	.80	.80	.82	.81
7	Service Units	.74	.70	.66	.65	.67
8	Sandwich Units					
9	Non-Sandwich Units	.44	.50	.48	.51	.49
Per Cent Total Variance		51	57	57	59	58

SOURCE: Author's computation

[1]The unrotated factor loadings were rotated in an orthogonal fashion.

TABLE 13

Rotated[1] Factor Loadings on the Attraction Dimension of the Relative Location Variables for Base Model Sites Plus Estimation Model Sites

		Attraction Dimension				
	Sites	A-K	A-L	A-M	A-N	A-O
	Variables					
1	Residential Units	.40	.42	.37	.36	.36
2	Intersections					
3	Front Footage					
4	Traffic Volume	.68	.73	.74	.76	.73
5	Convenience Units					
6	Shopping Units	.48	.42	.42	.40	.42
7	Service Units					
8	Sandwich Units	.84	.84	.83	.83	.84
9	Non-Sandwich Units	.72	.71	.73	.72	.73
Per Cent Total Variance		16	15	14	14	14

SOURCE: Author's computation

[1]The unrotated factor loadings were rotated in an orthogonal fashion.

TABLE 14

Rotated[1] Factor Loadings on the Exposure Dimension of the Relative Location Variables for Base Model Sites Plus Estimation Model Sites

		Exposure Dimension				
	Sites	A-K	A-L	A-M	A-N	A-O
	Variables					
1	Residential Units					
2	Intersections					
3	Front Footage	.90	.91	.89	.90	.89
4	Traffic Volume	.65	.63	.62	.60	.63
5	Convenience Units					
6	Shopping Units					
7	Service Units	.50	.57	.58	.61	.47
8	Sandwich Units					
9	Non-Sandwich Units					
	Per Cent Total Variance	15	14	14	12	11

SOURCE: Author's computation

[1]The unrotated factor headings were rotated in an orthogonal fashion.

Factor scores are presented in Table 15 for Sites K-O for each dimension and illustrated in Figures 11a, 11b, and 11c. The opportunity dimension is characterized by four sites having a significant negative score (Site K (-1.05), Site L (-0.87), Site M (-0.85), and Site N (-0.57)). In each of these cases, the intensity of land use or the unbalanced nature of the land use creates an environmental condition which lacks the necessary elements for a potentially high degree of spatial interaction. Site O, which has an environment that is reasonably well balanced and intensely used, exhibits a positive weight of 0.18.

Sites K, M, and O all show positive factor weights on the attraction dimension. Sites L and N exhibit negative weights. The relative high factor score (.77) for Site K is reasonable in light of the site's associating with the several eating establishments in the general area. A similar statement can also be made for Site M (0.37) and Site O (0.21), which are located along strips of a traffic artery which could be described as "restaurant alleys." The isolated fringe location of Site L (-1.06) prevents it from benefiting from the cumulative attractive powers of like establishments. Likewise, the residential environment and the barrier effect of an interstate highway isolates Sites N (-0.89) from the cumulative benefits of other eating establishments.

The dimension of exposure is a negative factor for all the estimation Sites K-O. Site K (-0.96), Site L (-1.16), Site N (-0.89) and Site O (-0.71) are all characterized by

TABLE 15

Factor Scores on Factor Dimensions
for Sites K-O

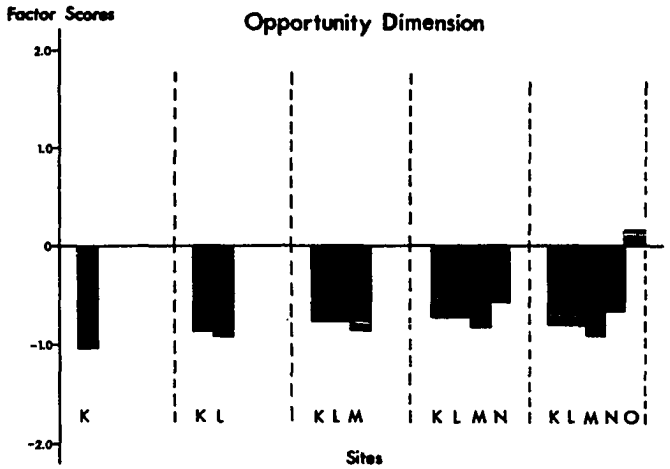
	Dimensions		
	Opportunity	Attraction	Exposure
Sites			
K	-1.05	0.77	0.96
L	-0.87	-1.06	-1.16
M	-0.85	0.37	-0.32
N	-0.57	-0.89	-0.89
O	0.18	0.21	-0.71

SOURCE: Author's computation

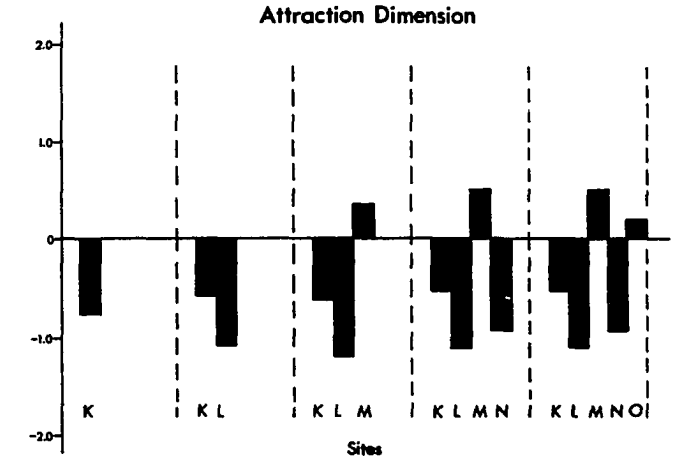
FIGURE 11

Factor Scores on Factor Dimensions by Site and Evaluation Iteration

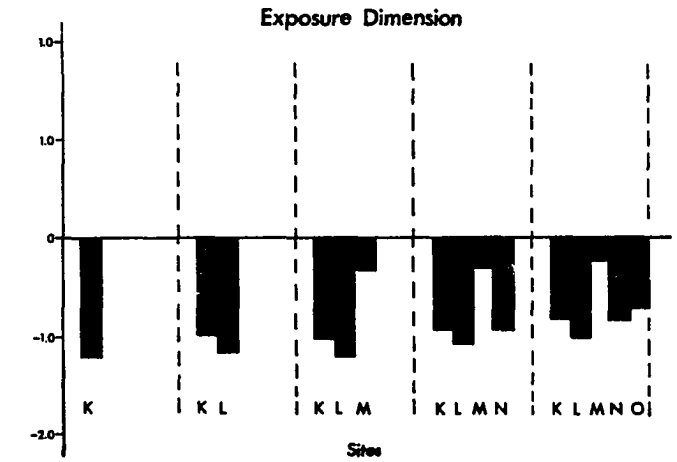
(a)



(b)



(c)



Source: Author's computations

low traffic volume and below average front footages. In the case of Site M (-0.32), the above average traffic volume is not enough to offset the below average front footage.

Average Monthly Sales Volume

The average monthly sales volume was an unknown value at the time of initial estimation. Once the estimation was made and reported to the case study firm, the firm then supplied the sales data for that particular site. The process was repeated for each of the five estimation model sites. The purpose of obtaining the actual sales volume was the obvious reason of residual analysis. In order to preserve the consistency of the discussion format, the sales volume data are presented here.

The average monthly sales volumes are given in Table 16 and illustrated in Figures 12a and 12b. The time frame, July 1972 to June 1973, is the same as it was for the base model. In Figure 12a, the sales volume record for each site is compared to the average of all sites A-O. All five estimation model sites fall below the overall average. The difference between each of the sites is relatively small, with Site M being slightly above the estimation model average and Sites K and L below that average.

The season sales volume pattern, as illustrated in Figure 12b, is similar to the base model pattern. The later spring and early summer months have an above average volume, while the winter months experience a below average volume.

TABLE 16

Average Monthly Sales Volume
July, 1972 - June, 1973

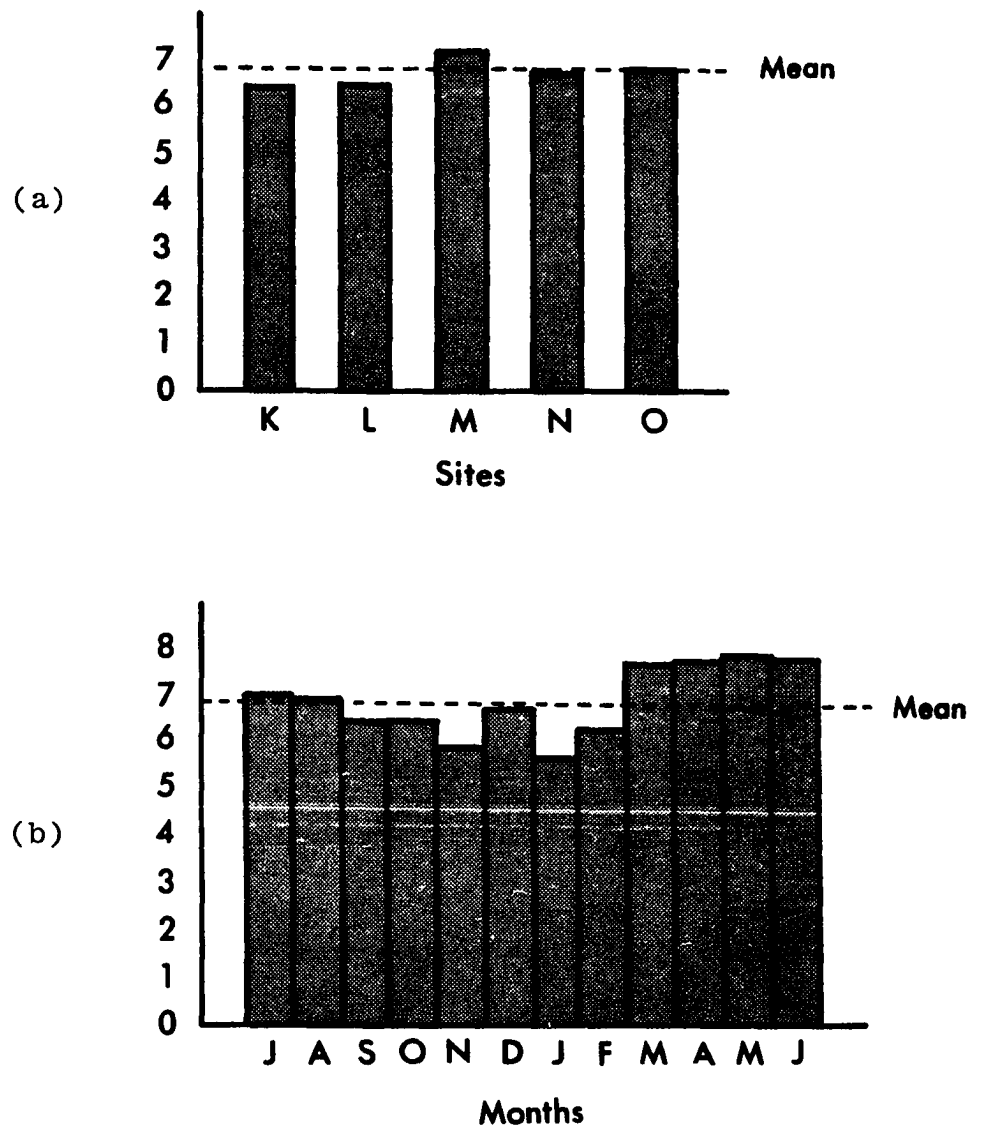
1972-1973	Estimation Model Sites					Mean
	K	L	M	N	O	
July	7.29	6.98	5.75	7.71	6.35	6.82
August	7.08	6.59	5.91	7.66	6.56	6.76
September	6.71	5.98	5.42	6.64	6.89	6.33
October	5.86	5.95	6.30	6.40	7.06	6.31
November	5.53	5.84	5.88	5.50	6.10	5.77
December	6.00	6.50	6.88	6.37	6.39	6.43
January	4.74	5.37	6.47	5.43	6.14	5.63
February	5.55	6.00	7.14	5.63	6.57	6.18
March	6.71	7.65	8.71	7.25	7.54	7.57
April	6.42	7.12	9.10	7.92	7.54	7.62
May	7.18	7.45	9.20	7.46	7.83	7.82
June	7.80	7.06	9.32	7.23	6.95	7.67
Mean	6.41	6.52	7.17	6.77	6.82	6.74

SOURCE: Vice President of Operations, Case Study Firm

FIGURE 12

Estimation Model

Average Monthly Sales Volume July 1972 - June 1973



Sales Volume Units

Source: Author's computations

This overall seasonal pattern is not only appropriate to the time period used in the study, but is, according to the firm's management, a good approximate reflection of the seasonal patterns over an extended time series.

Analysis of Dependence

The primary purpose of the estimation model is to estimate the average monthly sales volume for each new additional site. The procedures for accomplishing this purpose are outlined in Table 4. Steps 7, 8, and 9 of that table will provide the reader with sufficient information to conduct the dependency analysis.

The results of the individual estimates are given for Sites K-O in Table 17. These results are compared with the actual sales volume and the absolute residuals are examined. In addition, the standard error of the estimate is presented as a measure of the average scatter of Y values around the regression plane.

The overall results of the residual analysis are encouraging. First, all the absolute residuals are within one standard error of the estimate of 1.138. Second, the average error for all five estimates is 10 per cent, with a range from 5.6 per cent to 13.9 per cent. Finally, the error in each case is a logical explanation for the presence of the residual.

Three sites were overestimated; they are K, M, and O. The absolute residual of K is -0.56 which is an error of about 8.7 per cent. The overestimate of K should have been expected

TABLE 17

Absolute Residuals
Sites K-O

Site	Known Y	Computed Y	Residual $(Y-Y_c)^*$
K	6.41	6.98	- .56
L	6.51	5.98	.54
M	7.17	8.18	-1.00
N	6.76	6.38	.39
O	6.82	7.77	- .94

SOURCE: Author's computations

*Standard Error of the Estimate is 1.138

due to poor local management. At the mid-point of the research time period, a new manager was installed. To test the effect of this change, the predicted sales volume was compared to the actual sales volume generated for the last six months of the research time period. The average for that period was 7.02. The resulting residual (7.02-6.97) is an insignificant 0.05, or an error of less than 1 per cent.

In the case of Site M, the same explanation is possible. The local management problems were corrected at mid-point of the research time period with a new store manager. The absolute residual of -1.00 was an error statement of 13.9 per cent. With the management adjustment and a new residual calculated, based on that adjustment, an absolute residual (8.32-8.17) of 0.15 is obtained. This is an error statement of about 2 per cent.

Site O was hampered during the research time period by street construction and the remodeling of the building and adjacent parking lot. The absolute residual of -0.94 is an error statement of 13.7; however, considering the construction limitations at the time, this overestimate of the sales volume is reasonable.

Underestimates were made for both Sites L and N. A single explanation is not possible for either of these two sites; rather, the reasons for underestimation could be one of many factors. The young, aggressive management at both sites could be one explanation. In the case of Site L, one explanation is the fact that it is the first eating establishment

that potential consumers come to while traveling from a large recreational area to the city (an interceptor quality). The complete lack of competition in the trading area of Site N may be an additional explanation for that underestimation. In any case, the magnitude of the error statement, 8.1 per cent for Site L and 5.6 per cent for Site N, is not drastic or prohibitive.

The Base and Estimation Models: A Composite

After each estimate is made for an estimation model site, that site is included in the base model. This process of accumulation is continued until all sites (A-O) are included in the base model. In the final stages, the base model with its accumulated sites is the site evaluation model. As new sites are presented for evaluation, those sites will be treated as inputs into the estimation model. Once the estimate is made, the site will then become part of the general base or site evaluation model.

In order to overview the performance of the composite base and estimation models--the site evaluation model, a final regression analysis was conducted on all Sites A-O. The results of that analysis are shown in Tables 18 and 19. The final coefficient of multiple correlation (R) is .66, with a corresponding explained variance (R^2) of .44. The attraction dimension is the most important factor in explaining the relationship between sales volume and location. The attraction

TABLE 18

Values of the Regression Analysis

Variable	Cumulative R	Multiple R^2	Increase R^2
Attraction	.49	.25	.25
Exposure	.64	.41	.16
Opportunity	.66	.44	.03

SOURCE: Author's computation

TABLE 19

Absolute Residuals
Sites A-O

Site	Known Y	Computed Y_c	Residual $(Y-Y_c)$*
A	10.29	9.51	0.78
B	10.00	9.15	0.85
C	8.75	9.19	-0.44
D	8.73	8.44	0.29
E	8.60	8.30	0.30
F	5.60	8.53	-2.93
G	5.12	6.45	-1.33
H	10.44	7.63	2.81
I	8.78	7.79	0.99
J	8.89	9.15	-0.26
K	6.41	6.66	-0.25
L	6.51	6.06	0.45
M	7.17	7.95	-0.78
N	6.76	6.39	0.37
O	6.82	7.66	-0.84

*Standard error of the estimate is 1.43.

SOURCE: Author's computation

dimension accounts for 25 per cent of the total variance, while exposure and opportunity explain 16 and 3 per cent, respectively.

In Table 19, the absolute residuals for Sites A-O are presented. The standard error of the estimate (1.43) is also included. With the exception of Sites F and H, all sites fall within one standard error. Site F lies above a plus-one standard error, while Site H lies below a plus-one standard error. The reasons for these discrepancies have already been discussed above and no further elaboration is needed here.

In summary, Chapter VII has reported the results of the application of the site evaluation model. While several general conclusions can and will be made concerning these results, that discussion is reserved for the final chapter. It will suffice to say here that the results look promising, and the application of the site evaluation model is considered reasonably successful.

CHAPTER VIII

Summary and Conclusions

Summary

Retail site evaluation has been the problem focus of this research. The site evaluation process, which is merely one of the many processes in the retail firm's decision to locate, was examined with respect to the research question: Can relative location variables be used to estimate the potential sales volume of alternative retail sites, or can the positional qualities of a site within a defined relative environment (trade area) be used to evaluate alternative sites as to their sales volume potential? Essentially, the problem is one of evaluating the spatial attributes of a site for the purpose of conducting a retailing activity.

The construction of a site evaluation model was the principal vehicle used in examining and answering the research question. The retail site evaluation model was constructed in accordance with three research goals. First, to construct an evaluation model which could be quickly operationalized. Second, to develop the evaluation model in such a manner that it would be relatively inexpensive to implement. Finally, the model had to have the capability of giving an objective statement as to the place utility of a site for a particular retail

firm. In more general terms, the overall purpose of the study was to develop an operational model which could sequentially evaluate alternative sites and express the place value of those sites in terms of their present potential sales volume.

The site evaluation model which was developed rests on several premises. First, a site's place value is a function of that site's potential site-environmental relationships, linkages, and interactions. Second, measurements of relative location are good surrogate expressions of potential site-environmental relationships, linkages, and interactions. Finally, relative location measurements can be analyzed in an objective-statistical manner to obtain an estimation of the relative worth of a site to a potential retailer.

Justification of this research effort rests soundly on the need for more scientific and operational procedures in the site evaluation process. While the literature on site evaluation and selection outlines several avenues or approaches to the problem, these approaches tend to lack either the scientific rigor necessary to objective statements or the operational procedures necessary for implementation under real business conditions. In some cases, they lack both requirements. Additional justifications for the development of the model are its predictive qualities, the alleviation of socio-economic waste, and the reduction of business failures.

The retail site evaluation model has several operational parameters. First, it is only concerned with the large-scale site location problem; that is, the model is only

appropriate to the problem of evaluating a particular site relative to its environment. Second, the model is designed to handle the businessman's problem of finding a reasonable location for a given retailing activity. Third, the model's procedural steps allow it to evaluate any number of possible alternative sites; however, the evaluations must be sequential. Finally, the model was developed primarily to handle the multi-unit new expansion case.

Three perspectives of the site evaluation process were identified and incorporated into the model. The most important of these perspectives is that site evaluation is a relative location and/or environmental problem. Second, site evaluation is a commonness, not a uniqueness problem. The last perspective is that site evaluation is a utility assignment problem. These perspectives were all necessary inclusions if the site evaluation model was to be both operational and scientific.

The evaluation process is one of the several processes in the firm's locational decision. The recognition of this relationship led to the construction and discussion of the five retail locational decision processes. They are (1) the locational goal definition process, (2) the locational problem identification process, (3) the locational search process, (4) the locational evaluation process, and (5) the locational decision process. This discussion led to the recognition of subjective, as well as the objective, elements of the location decision process.

A review of the literature led to several principles of site evaluation. These principles were subsequently incorporated into the model. The nine principles are (1) generative location, (2) suscipient location, (3) interception, (4) cumulative attraction, (5) store association, (6) compatibility, (7) store saturation, (8) customer threshold, and (9) accessibility. The principles provided a conceptual and theoretical thread for the site evaluation model.

The retail site evaluation model consists of four operational acts; they are (1) selection, (2) measurement, (3) analysis, and (4) evaluation. The selection act is the process of selecting the relative location variables to be used in the model. Measurement act consists of gathering the data which is consistent with the selection act. The analysis of the obtained data constitutes the third act. The final operational act in the site evaluation model is the making of a value statement. The site evaluation model allows the evaluator to proceed from the selection of theoretical principles and variables to the assignment of a place utility statement for each site evaluated.

A regional chain of steakhouse restaurants provided the real business conditions under which the model was applied. This multi-unit case study firm provided the necessary cooperation and information for the testing of the model.

The application of the site evaluation model took the form of two operational models, a base and an estimation model. The base model consisted of ten sites and served as the

necessary statistical foundation for the estimation model. Sales volume estimates were made with a reasonable degree of success for five new sites in which the sales volume was unknown. The conclusion derived from this application provides the focus for the next discussion.

Conclusion

This research has produced several conclusions which are appropriate to the research aims. The first conclusion relates to the stated research question. A site's place value (as measured by its potential average monthly sales volume) is, in part, a function of that site's relationships, linkages, and interactions with its relative environment. In other words, variables of relative location can be used to estimate the potential sales volume of a site. This research demonstrated that using a limited number of relative location variables (9) and a limited relative environment (a primary trading area of less than one mile) the site evaluation model is capable of estimating a site's sales volume within an acceptable error. For those sites in which the sales volume was unknown, an average error of 10 per cent was obtained. Each of these sites was within one standard error of the estimate.

The increase in the coefficient of multiple correlation (from .58 to .66) and the increase in the explained variance (R^2) (from .34 to .44), which was associated with the increase in sample size, is promising. With the addition of still more

sites, and therefore, the allowance of additional independent variables (factored dimensions), this researcher believes that the site evaluation model will demonstrate an even stronger relationship between site and environment and thus will be able to estimate sales volume with an even greater precision.

The second conclusion is that the site evaluation model is able to meet many of the criticisms of the site evaluation approaches (Chapter II) outlined in the literature. First, the grouping of location factors is accomplished in an objective manner, rather than by a highly subjective rationale. The model employs Principal Component Factor Analysis to objectively group relative location variables into dimensions on the bases of their interdependence. This grouping eliminates the redundancy in the variables without the loss of any pertinent information. Second, there is an objective specification as to the importance or "weight" that each variable and/or dimension has in the analysis. The composition of each dimension is known and the importance of each variable in the dimension is expressed as factor loadings. In addition, factor scores are objectively derived "weights" that express the importance of each dimension for each observation (site). Finally, the weight and/or importance that each dimension has in explaining the sales volume for a particular site is objectively determined by the use of Multiple Stepwise Regression. Beta values and the variable entrance order are expressions of the weights and importance order. In summary, the site evaluation model provides a set of procedures which allow the

objective grouping and weighting of locational variables necessary to the objective evaluation of retail sites.

The third conclusion is that the model is a useful tool in developing empirical expressions for the theoretical principles of retail location. The model uses surrogate measurements of theoretical locational principles as inputs into a factor analysis. The locational principles are thereby reduced in number and incorporated into a few factored dimensions. The advantages of these dimensions are that they can be expressed in empirical terms and that they are completely independent of each other, thereby, their usefulness in the site evaluation process is greatly enhanced.

The next conclusion deals with the relative importance of the attraction, exposure, and opportunity dimensions. The cumulative attraction of "like" establishments is the single most important factor in estimating the sales volume of fast-food steakhouse restaurants. The second and third most important factors are exposure and opportunity. The association of these three dimensions and sales volume is sufficiently high to estimate the latter within an acceptable range.

The last three conclusions deal with the nature of the location decision process and the nature of the site evaluation problem.

The retail location decision process is largely a behavioral process. Most decisions regarding the firm's locational goal and objectives, its identification of location problems, its evaluation of various locational outcomes, and

its final locational selection are generally based on the subjective judgment of the firm's management. While this condition of subjectivity is the only practical means of accomplishing many aspects of the process, there is a need for the infusion of objective procedures which are capable of giving objective statements at various points within the total location decision process. One such point is the evaluation of alternative sites. The retail site evaluation model represents one set of objective procedures which is capable of being integrated into the largely behavioral location decision process.

The problem of site evaluation is not so much one of determining whether or not a site will be a success or failure, but one of actually forecasting the degree of success. Most astute businessmen have the ability to evaluate and select sites which will meet their minimum requirements. Their needs in terms of site evaluation are a set of procedures which are capable of giving an objective, empirical value statement for each site. Such a statement will then allow the firm to distinguish the relative worth of alternative sites. The site evaluation model developed in this research is capable of fulfilling this need.

Site evaluation can be conducted in a scientific manner. The retail site evaluation model developed in this research is a scientific model in that it meets all basic requirements of scientific research. The model is systematic in that it follows a prescribed set of operational procedures--the selection,

measurement, analysis, and evaluation acts. Each of these procedures is operationally defined. The model is controlled in the sense that the variables and their measurements are based on known principles of retail location. It is also controlled in the sense that objective statistical procedures are used to determine the interdependence of relative location variables and the dependence of sales volume and location variables. The model is empirical in that objective place utility statements are made concerning the worth of a particular site. The review of the estimated value statement conducted through the residual analysis meets still another requirement of scientific research, that is, that scientific research be a critical investigation. Finally, the model investigates a presumed relationship--the one that exists between site success and location.

Research Implications

The need for further research in the area of retail location is great. Problems of retail location range from developing traffic count techniques to incorporating the firm's outlet into one integrated marketing system. The research efforts suggested in the following discussion are only a few of the many possibilities.

There is need for research in the development of a total retail location program. Such a program would be composed of both subjective and objective procedures and models which would allow a firm to make locational evaluations and

decisions in a systematic fashion. A total program of retail location would not only include site evaluation (which was the purpose of this research effort) but also the necessary decision rules for objectively selecting alternative retail sites. In addition, the program should include evaluation and decision procedures for delineating and selecting general market regions as well as local trading areas. In summary, the retail location problem is complex and what is needed is a total integrated system of models, procedures, and programs that would allow the firm's decision makers to proceed in an organized objective fashion from the problem of market segmentation to the selection of retail sites.

The analysis of the regression residuals suggests several possibilities for further research. Consumer behavior patterns, socio-economic conditions, managerial abilities and standardized trade areas are all factors which need to be investigated. The discovery of the relationships of each of these factors to the sales volume patterns of retail establishments would prove to be useful in the selection of sites for those establishments. Examples of possible research questions might be: (1) What is the relationship between neighborhood status and the propensity to patronize a fast-food restaurant? (2) How far are consumers willing to travel in order to patronize a particular type of eating establishment? (3) What criteria do consumer groups use in choosing an eating establishment? (4) What is the relationship between area income levels and the sales volume of retail

establishments located in those areas? and, (5) Does trade area size vary for the same type of retail establishment in different market areas; if so, how does this variation affect sales volume? These are but a few of the many questions which could be asked regarding consumer behavior, socio-economic conditions and trade area size.

Further research possibilities are suggested by the factored dimensions of cumulative attraction and exposure. The following discussion is an example of some of the consumer behavior inferences which might be made regarding the meaning of the attraction and exposure dimensions.

The cumulative attraction of "like" establishments is the single most important factor in evaluating sites for restaurants. Potential consumers tend to gravitate toward areas in which the selection (product variety and quality, type of service, and pricing structure) of eating establishments is large. The mental mapping of consumers tends toward identifying areas rather than points. A consumer who is contemplating eating out will first identify an area or areas which contain several points (eating establishments or sites) capable of satisfying his needs. His first decision will be to select the area which he perceives as being able to meet his needs; that is, the area which has the greatest cumulative attraction. Once the consumer has made his decision as to the area, he then travels to that area before making a final decision as to which particular eating establishment he will patronize. His final decision on which establishment to

patronize is based on several factors; they are product offering, service type, pricing structure, and site character.

The consumer's awareness concerning the product, service, and price attributes of various establishments in the area is strongly influenced by the character of the site in terms of its visibility--hence, the importance of the exposure dimension. A site's exposure is the single most important location factor once the potential consumer is attracted to the general cluster of "like" establishments.

A potential customer is attracted to an area for the purpose of purchasing a meal. Once in the area it is the customer's intent to shop for that meal; in other words, he will make product, service, and price comparisons. His shopping, however, is strongly influenced by what he sees or perceives. This, in turn, is strongly influenced by the character of each site within the area. Those sites which have good exposure will tend to be more readily perceived and considered in terms of products, services, and price offerings. Sites which have poor exposure may not be perceived at all or will tend not to make as strong an impression as a site with good exposure.

In the evaluation of a site's potential for a prepared food establishment, the first factor to consider is whether or not the site's immediate environment contains the necessary "like" establishments to generate a cumulative drawing power for the area. If the cumulative attraction is adequate, the next factor to consider is whether the site character in terms

of exposure is adequate to bring to the customer's attention the product, service, and price attributes of the firm's establishment.

The above inferences provide a host of potentially viable research questions. For example: (1) Are restaurants convenience or shopping goods establishments and what effect would this classification have on the site selection process? (2) Do consumers identify areas or points as spatial references in their shopping behavior? (3) What types of mental maps do consumers form in selecting shopping establishments? and (4) What role does visibility and/or accessibility have in developing the shopper's awareness space? Questions such as these should provide this researcher a lifetime of work in the field of retail location.

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