

Trading-Area Analysis

Understanding Your Retail Trade Area

Albert E. Myles
Economist and Extension Professor
Department of Agricultural Economics
Mississippi State University

An important first step in any market analysis is to define a town's trade area.

- A trade area is determined by its ability to attract customers given impeding or enhancing factors (Bakewel).
- Knowing the boundaries of the trade area defines the number of potential customers that may patronage your downtown (Ryan, Wisconsin).



What is a Trade Area?

- The farthest distance consumers are willing to travel to purchase retail goods and services.
- The size of a retail trade area depends on the variety of goods and services offered in the community and its proximity to competing retail markets.

Trade area analysis provides the foundation for:

- understanding the geographic extent and characteristics of store patronage,
- assessing performance spatially,
- performing competitive analysis,
- evaluating market penetration and market gap analysis, and
- target marketing (Segal)

CONVENIENCE SHOPPING



COMPARISON SHOPPING

How Trade Areas Differ

- Different business types have different trade areas.
- People will travel from greater distances to purchase certain goods and services.

Individual stores may have its own unique trade area and these areas can often be generalized into two different types: **CONVENIENCE SHOPPING TRADE AREAS** and **COMPARISON SHOPPING TRADE AREAS**

Local Convenience Trade Areas are based on:

-Ease of access to these types of products. People will obtain such products as gasoline, groceries, etc., based on travel distance or travel time.

Comparison Shopping Trade Areas are based on:

-Price, selection, quality and style. People are more likely to compare such goods as appliances, furniture, etc., as well as travel longer distances for their purchase.

Therefore, the **TRADE AREA** will shrink or grow depending on the products sold.

In addition to different types of shopping goods, there are also different market segments or customers that frequent a downtown.

The three common market segments are: local residents, daytime employees and tourists.

Local Residents



Daytime Employees



Tourist



Local Residents – live within the trade area. Since they reside year-round, they provide the majority of spending potential for most downtowns.

Daytime Employees – may live in the trade area, but may also commute from other outside areas. They provide the potential to stay and make purchases

Consumers are willing to travel farther to purchase high order/high-priced goods such as: *automobiles, furniture, recreational vehicles and specialty items*

However, consumers prefer to travel locally to purchase lower order/low-priced goods such as: *clothing, drugs, groceries and gasoline*

Factors Affecting a Trade Area

1. Size and retail mix of the town.
2. Size and retail mix of competing locations.
3. The transport network around the host town – particularly as it relates to roads in rural areas.
4. Physical barriers such as: oceans, lakes, railway tracks, motorways, or national parks and forests.

A variety of techniques can be used to determine the trade area boundaries.

A map displaying the Primary, Secondary and Tertiary Trade Areas with competition and geographical highlights.



It is typical for a trade area to have a Primary and Secondary Trade Area

- **Primary Trade Area** is usually the geographic area in which between 55% and 70% of customers originate.
- **Secondary Trade Area** represents a further 15-20%. Combined, these trade areas equal the **Main Trade Area (MTA)**, which usually represent 70-85% of customer origin.
- **Tertiary Trade Areas** usually delineated for larger centers only and accounts for 5-15% of additional trade. The remainder coming from Beyond Trade Area (BTA).



RULE OF THUMB...

The smaller the town...the more compact the trade area and its drawing power.

Bakewell

Analyzing a Trade Area

When analyzing a trade area...look for:

1. Recent trends in population,
2. Retail sales,
3. Per capita income, and
4. Pull factors.

Distance Traveled by Consumers

A study of Langdon, North Dakota shoppers indicated the following:

- The average one-way distance that residents traveled to shop varied between 17.3 – 19.1 miles for convenience and specialty goods.

Specific Miles Traveled:

14.8 miles for gas and diesel products
16.3 miles for groceries
16.1 miles for eating places
16.9 miles for banking and savings
18.6 miles for hardware, and
19 miles for prescription drugs

Similar Miles Traveled:

16.9 miles for auto repairs
17.0 miles for beautician
18.6 miles for radios, TVs, VCRs
16.5 miles for sporting goods
19 miles for men's clothing
20.4 miles for legal services
20.7 miles for hospitals, and
20.8 miles for furniture

Estimating Retail Demand

By collecting information on:

population, income, state retail spending or sales, consumer spending patterns

You can measure retail market demand by: multiplying the number of households in the host community and the rest of the county by the average amount spent by households for various retail goods and services in the state.

No. of households x typical purchases/household = market demand³

³ Also called "market potential," "potential sales," or "sales demand."

Future Retail Demand from Population Growth

Host town's population is expected to grow 7.3 percent by 2010. This will result in new market demand in major retail categories of approximately \$__ million (expressed in current-year dollars) in the Host town by 2010.

Factors Affecting Retail Leakage

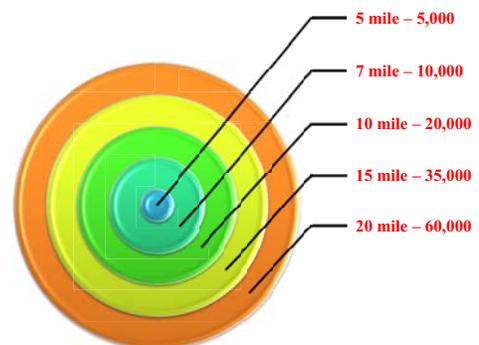
Local towns/trade areas will always lose some shoppers to neighboring towns for several reasons.

- Shoppers in the host town will live closer to other towns where it may be more convenient to shop.
- Larger towns often have an image of greater variety, quality, and lower prices for many goods and services.
- Some towns have businesses which have a reputation for providing excellent service and quality merchandise.
- When people travel to other towns, primarily for reasons other than shopping, they likely may spend some time shopping for other goods and services.

Delineating Trade Area

There are several techniques available to define a trade area. These techniques have different uses as well as their own advantages and disadvantages.

Concentric Circles or Ring Studies



Drive Time

- Defines the trade area based on the amount of time it takes to drive to a community or retail location.
- Drive time trade area will always be irregularly shaped because of the layout of road systems, difference in speed limits on roads/freeways and geographic barriers.

This methodology is often used in urban setting with high population density. A rule-of-thumb used in retail industry is that consumers will typically drive 15 minutes to shop.

NOTE: For rural areas, drive time could be as much as one-hour.

Zip Code Tabulation

- Tabulate the number of customers by their zip codes.
- Zip code collection can be built into point-of-sale machines.
- Customer's zip code can be input to a cash register and then downloaded into a ready-to-use spreadsheet format.
- Once zip codes are in spreadsheet format, this information can be summarized by the number and percentage of people originating in each zip code.
- When the zip code percentages are known, they can be categorized into a trade area.
- Trade area is defined as those zip codes that comprise about 75% of the customers.

Point of Sale Data

Customer point-of-sale (POS) data is collected by:

- In-store surveys
- Courtesy card programs
- License plate surveys
 - Credit card transactions
 - Through raffles
 - Business card collection

From this information a trade area map can be developed to provide a very accurate and precise picture of the spatial distribution and characteristics of store trade areas

Traffic Flow....

is the random canvassing of parking lots at major locations in town at different times on different days and over several weeks.

The locations might include

- ✓ the downtown area,
- ✓ major shopping destinations such as shopping malls and centers, Wal-Mart Super Center, Home Depot, Krogers', and
- ✓ other popular establishments in town.

One should combined the results of vehicle license plates from the different locations to obtain a composite count of vehicles from surrounding counties and compare them to regional commuting data.

Results from a traffic study will usually reveal **the major towns and counties that comprise the local trade area or market.**

To determine the major communities in the local market one should:

1. Rank order the number of cars from various counties in the region, and
2. Select the top five or six localities based on the highest frequency and/or maximum percentage (10% or more) of license plates in the area.

Commuting...

Commuting time to work by local residents is another way of delineating a community's retail trade area.

Converting commuting time to work into spatial distances or miles and plotting these data on a map, provide a visual picture of the geographic size of its trade area.

Gravity Models

Gravity or spatial interaction models provide an approximation of store trade area by looking spatially at the distribution of all locations and evaluating each locations relative attractiveness.

Gravity modeling is a sophisticated technique which can account for the effects of competitors and is appropriate for convenience scenarios.

Small differences in the gravity model parameter can have a large effect on the resulting trade area.

Reilly's Law of Retail Gravitation

Reilly's Law of Retail Gravitation is a theoretical means of trade area definition.

Is based on the premise that people are attracted to larger places to do their shopping.

Time and distance traveled influence willingness to shop in a given city.

More likely to travel shorter distances when possible.

A mathematical formula can be used to calculate hard numbers relating to distance people will travel.



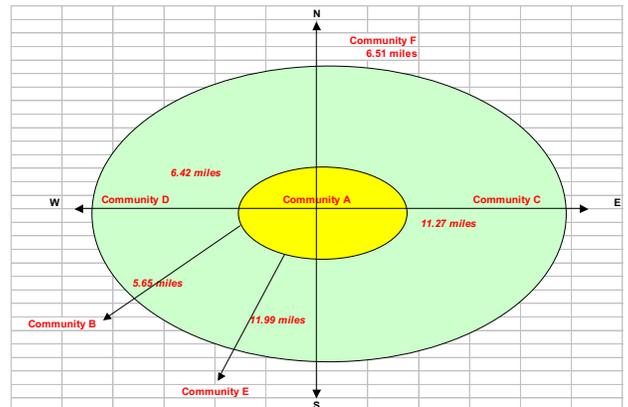
Maximum Distance to Smaller Town (Y) =

$$\frac{\text{Road Distance Between Towns (X) and (Y)}}{1 + \frac{\text{Population of Larger Town (X)}}{\text{Population of Smaller Town (Y)}}}$$

Population and Travel Distances in Community A's Trade Area.

County	Total Population	Distance	Trade Area Distance
(from Community A to County Seat)			
Community A	22,000		
Community B	1,543	27	5.65
Community C	23,799	23	11.27
Community D	2,145	27	6.42
Community E	7,169	33	11.99
Community F	8,489	17	6.51

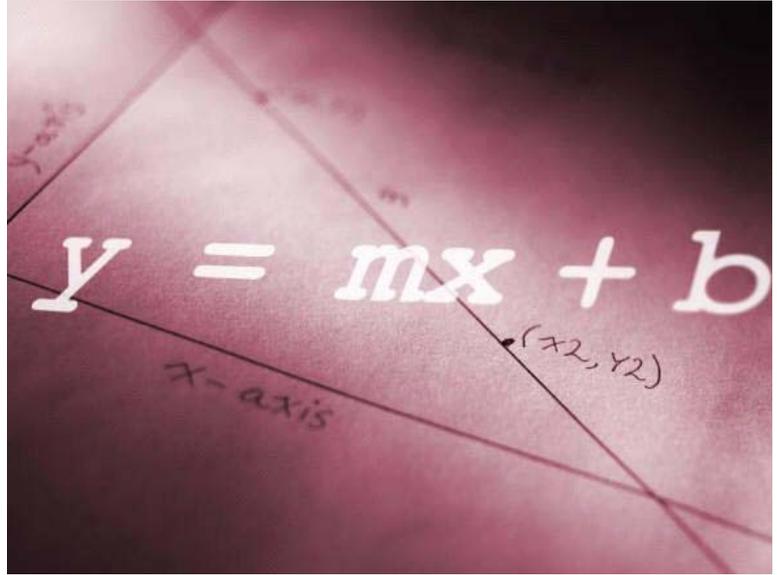
Figure 1. Picture of Community's Trade Area



Estimating Total Market Size

Once the physical boundaries of the trade area have been identified, one should **estimate the total market size**.

The total market consists of populations in the host community plus population from surrounding towns in the trade area.



Market Penetration Approach

Assumes that there is a spatial variation in the proportion of households served by a town to competing towns.

Provides answer to basic question... *What is the probability that a customer will decide to shop at a particular location, given the presence of competing towns?*

$$P_{ij} = \frac{A_j^\alpha D_{ij}^{-\beta}}{\sum_{j=1}^n A_j^\alpha D_{ij}^{-\beta}}$$

Where:

- P_{ij} is the probability of customer in origin town i shopping in destination town j
- A_j is a measure of attractiveness of community j , such as total retail sales, total personal income, or population of area
- D_{ij} is the distance from host town i to town j
- α^2 is an attractiveness parameter estimated from empirical observations
- β^3 is the distance decay parameter⁵ estimated from empirical observations. Simply, it is a parameter that reflects the propensity to travel by consumers.
- n is the total number of communities including the host community _{i} .

The product derived from dividing $A_j^\alpha D_{ij}^{-\beta}$ is known as the perceived utility of host community_i.

The α parameter is an exponent to which a community's attractiveness value is raised and enables the user to account for nonlinear behavior of the attractiveness variable.

The β parameter models the rate of decay in the drawing power of host community_i as potential customers are located further away from the community.

Operationalizing

Calibrate the gravity model on the existing competitors in the market area. Specifically, choose a set of parameter values for the *Attractiveness* coefficient (alpha) and the *Distance Impact* coefficient (Beta) that fit the existing data well. Starting values can be alpha = 1 and beta = 1, unless there is reason to believe that other values are more likely to recover the current market shares of the competitors.

Calculations

The trade area population can be obtained by multiplying P_{ij} by the population of each town in the host town's trade area.

These estimates would be summed for competing towns and added to the host town's population to obtain the total trade area population from each town in the study.

The Huff Model as it is formally called is a tool for formulating and evaluating business geographic decisions.

The model has had widespread usage...for example, the model has been used in:

- Estimating market potential
- Defining and analyzing trade areas
- Evaluating market penetration
- Assessing economic impact
- Predicting consumer shopping selections
- Profiling and targeting consumers
- Forecasting sales of existing and potential outlets
- Assessing the impact of environmental changes

The model is based on the premise that when a person is confronted with a set of alternatives, the probability that a particular item will be selected is directly proportional to the perceived utility of that alternative. Choice behavior can be viewed as probabilistic. It is unlikely that any given alternative will be selected exclusively unless no other alternatives exist. This proposition can be expressed symbolically as follows:

$$P_{ij} = \frac{U_{ij}}{\sum_{j=1}^n U_j}$$

- Where P_{ij} is the probability that an individual i will select alternative j given the utility of j relative to the sum of the utilities of all choices n that are considered by individual i .
- It was hypothesized that for certain products, the size of the town was more important than it was for others. Thus, the value of the exponent would be expected to be larger. Conversely, the exponent for distance was assumed to be negative. Convenience products could be expected to have a larger exponent while specialty goods would be much smaller. Thus, the utility of a town j to a consumer at i would be derived as follows:

$$U_{ij} = A_j^\alpha D_{ij}^{-\beta}$$

Where A_j is the attractiveness variable such square footage or retail sales of selling area, population, personal income of town j , D_{ij} is the distance between town i and town j , and α and β are parameters to be estimated based on the actual survey data. The probability of a consumer located at town i selecting town j can be estimated as follows:

$$P_{ij} = \frac{A_j^\alpha D_{ij}^{-\beta}}{\sum_{j=1}^n A_j^\alpha D_{ij}^{-\beta}}$$

Most analysts who use the Huff Model incorporate some measure of accessibility such as road distance, travel time, or cost as well as a variable to reflect the attraction of a given destination.

The weights, that is, parameters associated with the variables, are often assigned arbitrarily. They are rarely estimated statistically. There are several reasons more analysts do not calibrate the model statistically.

First, the nonlinear properties of the model are perceived by some users to be much more difficult to calibrate since it is first necessary to make the model linear with respect to its parameters before standard statistical estimation procedures can be applied.

$$\sum_{j=1}^{\eta}$$

The model can be transformed into a linear form in the parameters by applying the following transformation to P_{ij} :

$$\ln P_{ij} = \alpha \ln A_j - \beta \ln D_{ij} - \alpha \ln A_j + \beta \ln D_{ij}$$

Linearization of the model makes it easier to determine trends and select the most appropriate form of the model

Market Share Analysis

Once the parameters have been determined statistically, the model can be used to estimate retail expenditures by consumers from a given geographic area that are expected to be obtained by town i within the study area.

That is:

$$E_{ij} = P_{ij} B_j$$

where E_{ij} the expected expenditures that will be made from host town i to town j ; and B_j the total expenditures available in town j . The total sales of each town in the study area can be determined by summing the expected expenditures from each geographic area for all towns. That is:

$$T_j = \sum_{i=1}^{\eta} E_{ij}$$

where T_j = the total expected sales in town j . The market share of each town within the trade area is each town's total expected sales divided by the total sales of all towns. That is:

$$M_j = \frac{T_j}{\sum_{j=1}^n T_j}$$

Where M_j = the market share of town j

Steps Involved in Estimating Parameters

The steps involved in obtaining the necessary data to calibrate the model are listed below.

- Delineate the trade area.
- Divide the trade area into geographic regions.
- Specify the centroids of the towns.
- Identify all competing towns within the study area and indicate the coordinates of each town.
- Determine the distances or travel times between the centroids of all towns and the host town.
- Specify attributes of the host town that could influence consumer preferences.
- Indicate economic, social, and demographic data for all towns
- Conduct a survey of households within each town to determine the frequency at which consumers patronize other towns within the trade area.



Town Competitiveness

The proximity of each town to the host town will affect local patronage. All things being equal, the more centrally located a town is to its target population, the greater the likelihood that consumers will shop locally versus in other towns.



Impact Assessment

Assume that the sales leakage from the study area is offset by purchases made by consumers who reside in other towns, then the total estimated sales would be equal to total expenditures within the study area.

Once you have the model parameters, the model can be used to estimate the sales of a different town or the competitive impact of change that has occurred within the study area.

Trade Area Comparisons

A visual assessment of the new town's impact on the host town and existing towns can be made by comparing the trade areas of the towns before and after the inclusion of the new town.

That is...the expected sales of seven town rather than six towns can be estimated from the model. The impact can be assessed to determine whether the host town will lose or gain retail sales due to increased competition in the trade area by the new town.

Application of Gravity Concepts

Gravity analysis is a spatial analysis technique used to identify **trade regions**, **predict the market share**, and **potential sales** for a retail location based on its location relative to potential customers and competitors.

- Spatial and demographic data
 - Distance
 - Population
 - Per Capita Income

This “Dis-Cal” is an Excel spreadsheet that calculates the distance between 2 places using latitude and longitude coordinates for a particular geographic area.

Determine market share by scores					Determining Sales in particular tract																								
$\text{Score} = \frac{\text{Attractiveness}}{\text{Effective Distance}}$					$\text{Sales for subject site} = \text{Mkt Sh} \times \text{Total market for a particular tract}$																								
<p>**Attractiveness is assumed to be how big (e.g. population, retail sales, employment, etc) the area is</p> <p>**Distance is calculated to a particular town (Cluster)</p> <table border="1"> <thead> <tr> <th></th> <th>Retail sales</th> <th>Distance</th> <th>Score</th> <th>Market Share</th> </tr> </thead> <tbody> <tr> <td>Host town</td> <td>4,000</td> <td>3.2</td> <td>1,250</td> <td>47.85%</td> </tr> <tr> <td>Competitor 1</td> <td>2,300</td> <td>4.2</td> <td>548</td> <td>20.98%</td> </tr> <tr> <td>Competitor 2</td> <td>3,500</td> <td>4.3</td> <td>814</td> <td>31.16%</td> </tr> <tr> <td></td> <td></td> <td></td> <td><u>2,612</u></td> <td><u>100.00%</u></td> </tr> </tbody> </table> <p>Market share of the host site is 1,250/2,612 = 47.85%</p>							Retail sales	Distance	Score	Market Share	Host town	4,000	3.2	1,250	47.85%	Competitor 1	2,300	4.2	548	20.98%	Competitor 2	3,500	4.3	814	31.16%				<u>2,612</u>
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The gravity model can be used on both ends of the retail industry. It can be used for decision-making related to total shoppers and sales flow. Sales flow is best explained as the calculation of potential sales originating from an area.

The gravity model is also used to provide insight related to shopping centers and department stores.

The gravity model can be used to verify the domestic market potential for each town in the trade area. The model can be used to obtain another perspective of how attractive one area is to another.

Using the formula previously mentioned, the domestic market potential can be obtained by multiplying the population of the host city by its mean per capita income and dividing by the distance to adjacent cities. The resulting figures for all the adjacent cities were added together to achieve the market potential for a city. The city with the highest market potential represents a good market and strong competitor in the trade area. Thus, gravity models can provide general trade areas for the host city.

The gravity model provides an advantage to show the domestic market potential quantitatively, even though the results may be more generalized. The gravity model, uses population, distance, per capita income, and retail sales to determine the potential demand in the trade.

CONCLUSIONS

To fully understand the retail potential of the your trade area, you should conduct the following analyses:

- Develop a drive time (15 – 20 minutes) or gravity model delineation of the trade area
- Study the customers in the trade areas according to buying habits and lifestyles
- Develop a profile of the trade area's customers
- Determine the surplus and leakage for all retail products or sectors in the trade area

Leakage Analysis

Determine the amount of leakage or surplus in the trade area. Typically, this is represented by the pull factor (PF), which varies from less than one to greater than one.

You might think of one as representing the baseline or accepted level. That is, the trade area (TA) is neither capturing nor losing retail trade to surrounding areas.

When the PF is >1 , the TA is experiencing surplus retail trade. In other words, it is attracting customers to the area from surrounding towns. A PF <1 has the opposite interpretation. That is, the trade area or town is losing retail trade to neighboring towns.

One numeric value of PF can be derived by comparing the demand for retail trade to the supply of retail trade.

Some of the key trade area variables include:

Number of Households (by age)

Average household income (income class)

Total potential demand (# of households x average household income¹)

Total supply² (actual or current retail sales in trade area)

Leakage or /Surplus (difference between demand and supply): it one way to identify potential retail opportunities in the TA

Psychographics

The psychographic (age distribution) profile of the households in the trade area.

Dominant Towns

Determine the dominant towns in the trade area. For example: *Any town that has at least 15 to 20 percent of the trade area population.*

Summary

This presentation shows how a few simple techniques can be used to determine the geographic size of a town's trade area.

A trade area will often extend beyond its own geographic borders.

In using these approaches, there are a few caveats:

1. Areas with large populations can distort the actual situation in retail trade analysis.
2. Reilly's Law is less accurate when involving larger towns.



Questions???



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