

C-STORE VALUATIONS

Dear Reader:

Thank you for your interest in our Whitepaper, "Toward a Better Understanding of Reilly's Law and the Trade Area of Convenience Stores". Enclosed is your complimentary copy. We hope you will find it helpful and informative. This paper explores the basis of the Inverse Square Law in Reilly's Law and suggests that retail trade areas are actually geographically larger than what Reilly's Law implies.

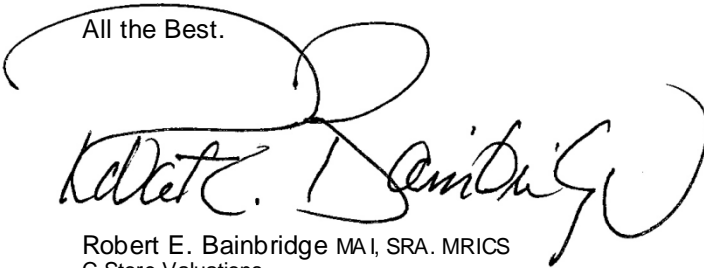
For additional information about current valuation issues in the retail convenience channel, you may wish to visit our website at www.cstorevalue.com. On the "Video Insights" page you will find short, appraisal-related video clips on these important topics:

1. Development Process
2. Supply and Demand
3. Hypermarket Competition
4. What Should be in an Appraisal of a C-Store: A Lender's Perspective
5. A Business Appraiser's Perspective
6. Retail Site Analysis
7. Below-Cost Selling

At our website you will also find useful Whitepapers and current valuation metrics.

If we can be of any assistance to you, it would my pleasure to personally serve you. Please let us know and thank you again.

All the Best.



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C-Store Valuations



WHITEPAPER NO. 5

**RING AND DRIVE-TIME STUDIES FOR RETAIL TRADE AREAS:
DOES IT MAKE A DIFFERENCE?**

By
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Summary

Ring and drive-time studies are commonly used in the market analysis of retail trade areas. With the recent proliferation of powerful proprietary software available through the Internet, the analyst may now complete these types of studies quickly and inexpensively from desktop applications. The analyst often has the choice of selecting either a ring study or a drive-time study

The purpose of this paper is to examine whether a difference results when a ring or drive-time study is chosen.

This investigation found that a statistically significant difference exists for population and retail sales estimates for the 1-mile ring and the 1-minute drive time.

Introduction

Many retailers in the U.S. use market studies to evaluate the sales potential of new sites. [Fanning 114] Shell, KFC and Burger King are a few examples of retailers that began using proprietary software in the early part of this decade to assist in market analysis for new store locations. One of the first widely available proprietary programs that was used by these retailers was MS Connect AnySite®. The program was delivered to the user via the Internet. By selecting any street in the U.S., the user had the choice of using either a ring study or a drive-time study and could then input three choices of geographic boundaries to examine the market based on the delineation selection. For a ring study, the analyst could input three choices of radii as specified in miles. The choices might, for example, be the one, three and five-mile rings for the particular address. The program would instantly produce a map showing these three rings with the subject at the center. An exhaustive amount of demographic information was then instantly available. The demographic information was separated into individual printable reports for each of the rings. This demographic information included such socio-economic metrics as population, number of households, age, race, ethnicity, income levels, etc. In a drive-time study, the concepts are similar except instead of concentric rings, the trade area boundaries are drawn based on the time it takes to drive to the subject from the any point around the periphery. Common drive-times for convenience concepts might be a one, two and three-minute drive-time. An output example is included in the addenda. This example was produced from Site To Do Business®, which now incorporates the ESRI platform.

Programs that delivered this market analysis information over the Internet were superior to packaged software because the data were always current. No need existed to update the street addressing capabilities or demographic data with supplemental disks or downloads. Each year more and more specialized applications of this type of software are being developed. Today, MS Connect AnySite® is no longer available, having been replaced by superior products. Currently, ESRI is dominating the market for this type of product. As of the Fall of 2006, Site To Do Business®, the market analysis product developed and used by the CCIMs, has shelved their previous in-house platform and adopted ESRI into their offering at the Site To Do Business website. By the end of 2006, their transition to ESRI is expected to be complete.

Nearly all of the proprietary market analysis programs, including ESRI, offer the analyst the choice of using either a ring study or a drive-time study, but not both at the same time. In other words, it's either one or the other.

The Problem

In executing these market analysis programs, the analyst never knows whether or not different results would be obtained by using one method (ring) or the other (drive-time). In the business world today, time and cost efficiency often preclude completing both methods for the same property. The analyst is simply left with making the choice of using either a ring or a drive-time study without knowing if different results would have been obtained from the method not chosen. For a demographic characteristic, such as population count or median household income, significant differences in these types of

demographic metrics could alter the retailer's decision as to whether a new store should be constructed at a particular location. [Fenker 32] For example, the population count with a specified ring or drive-time could be used in a location quotient calculation. [Bendavid 62] Variation in the population count would produce different location quotients. If the variation were large, the resulting location quotient may indicate an over-supply (less than "1") or under-supply (greater than "1"), when the alternative method indicated an opposite result.

For convenience concepts such as fast food restaurants and gas stations, a mile ring and two-minute drive time are considered the boundaries of the primary market [Schmitz 144].

This paper asks the question: Do ring studies produce significantly different results from drive-time studies in quantifying the demographic characteristics of retail trade areas?

Methodology

Analysis of the variance (ANOVA) test will be used to test for differences between the demographic output results from ring and drive-time market studies on three critically important retail demographic variables: population, median household income and retail sales potential. [Utts 374] Twenty three locations of the Walker Oil Company retail convenience stores will be used as the test case. These stores are actual properties analyzed in a recent appraisal assignment.

The ANOVA analysis will be performed on all 23 locations with the 1-mile ring compared to:

- a. 1-Minute Drive-Time
- b. 2-Minute Drive-Time
- c. 3-Minute Drive-Time

for the three demographic metrics: population, median household income, and retail sales potential for gasoline.

The null hypothesis assumes the means of all groups are equal

The null hypothesis: $(H_0): \mu_A = \mu_B \dots$

The alternate hypothesis: (H_1) : These means are not all equal.

We will use a level of significance (α) of 0.05.

MiniTab©, a statistical analysis program taught by the University of St. Thomas in the Master of Science in Real Estate Appraisal Program, will be used to perform the ANOVA analysis.

The Results

The results of the ANOVA analysis are summarized in the table below and the output summary of each of the nine comparisons is contained in the addenda.

ANOVA SUMMARY

	P-VALUES	CONCLUSION
POPULATION		
1-Mile Ring and 1-Minute Drive-Time	0.0000	Reject the Null Hypothesis
1-Mile Ring and 2-Minute Drive-Time	0.0680	
1-Mile Ring and 3-Minute Drive-Time	0.3350	
MEDIAN HOUSEHOLD INCOME		
1-Mile Ring and 1-Minute Drive-Time	0.2670	
1-Mile Ring and 2-Minute Drive-Time	0.8690	
1-Mile Ring and 3-Minute Drive-Time	0.9780	
RETAIL SALES POTENTIAL		
1-Mile Ring and 1-Minute Drive-Time	0.0000	Reject the Null Hypothesis
1-Mile Ring and 2-Minute Drive-Time	0.0880	
1-Mile Ring and 3-Minute Drive-Time	0.2980	

The selected level of significance is 0.05. For p-values less than 0.05, the null hypothesis is rejected.

Conclusion

This investigation found that statistically significant differences exist for the mean values of the 1-mile ring for population and retail sales potential at the 1-minute drive-time. In other words, the 1-minute drive-time is not a proxy or a good substitute for the 1-mile ring. This investigation indicates that if the analyst chose a 1-minute drive-time versus a 1-mile ring, different estimates of population and retail sales potential are likely to result. The 1-mile ring better emulates the 2 and 3-minute drive-times.

These results show that the selection of rings and drive-times are not trivial and the analyst should use care and thought before making these choices and completing the market analysis.

Suggested Further Research

1. Data may be grouped into urban and rural locations. Drive-times often encompass a larger geographic area in rural areas. Different results may be obtained for the p-values if this grouping is performed as part of the analysis.

2. Broader geographic areas may be considered. Here, all of the observations were in the State of Utah. Although no reason exists for this data to be skewed simply because of its limited geographic scope, the results of an analysis of a larger geographic area may be compared to these findings to confirm the conclusion found here.

Sources Used in the Paper

Books:

Bendavid, Avrom. *Regional Economic Analysis for Practitioners*. New York: Praeger Publishers. 1974

Fenker, Richard M.. *The Site Book*. Ft. Worth, Texas: Mesa House Publishing. 1996

Fanning, Stephen F. *Market Analysis for Real Estate*. Chicago: Appraisal Institute. 2005

Schmitz, Adrienne and Brett, Deborah L. *Real Estate Market Analysis*. Washington, D.C.: Urban Land Institute. 2005

Utts, Jessica. *Seeing Through Statistics*. Pacific Grove, California: Brooks/Cole Publishing Company 1999.

Websites:

ESRI www.esri.com

Site To Do Business www.stdbonline.com

Addenda

ANOVA ANALYSIS

Population: 1-Mile Ring and 1-Minute Drive-Time

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	1	428720579	428720579	20.02	0.000
Error	44	942358709	21417243		
Total	45	1.371E+09			

Individual 95% CIs For Mean
Based on Pooled StDev

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev	
-					
POPULATI	23	7018	6477	(-----*-----)	
1-MIN PO	23	913	941	(-----*-----)	
-					
Pooled StDev =		4628		0	3000 6000 9000

Population: 1-Mile Ring and 2-Minute Drive-Time

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	1	97208628	97208628	3.51	0.068
Error	44	1.219E+09	27701908		
Total	45	1.316E+09			

Individual 95% CIs For Mean
Based on Pooled StDev

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev	
-					
POPULATI	23	7018	6477	(-----*-----)	
-)					
2-MIN PO	23	4111	3668	(-----*-----)	
-					
Pooled StDev =		5263		2000	4000 6000 8000

Population: 1-Mile Ring and 3-Minute Drive-Time

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	1	52871040	52871040	0.95	0.335
Error	44	2.448E+09	55646350		
Total	45	2.501E+09			

Individual 95% CIs For Mean
Based on Pooled StDev

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev	
+--					
POPULATI	23	7018	6477	(-----*-----)	
3-MIN PO	23	9163	8327	(-----*-----)	
+--					
Pooled StDev =		7460		5000	7500 10000 12500

Median Household Income 1-Mile Ring and 1-Minute Drive-Time

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	1	247957096	247957096	1.27	0.267
Error	44	8.613E+09	195760217		
Total	45	8.861E+09			

Individual 95% CIs For Mean
Based on Pooled StDev

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev			
MEDIAN H	23	48642	9104	(-----*-----)			
1-MIN ME	23	43998	17568	(-----*-----)			
Pooled StDev = 13991				40000	45000	50000	55000

Median Household Income 1-Mile Ring and 2-Minute Drive-Time

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	1	2147472	2147472	0.03	0.869
Error	44	3.427E+09	77892377		
Total	45	3.429E+09			

Individual 95% CIs For Mean
Based on Pooled StDev

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev			
MEDIAN H	23	48642	9104	(-----*-----)			
2-MIN ME	23	48209	8538	(-----*-----)			
Pooled StDev = 8826				45000	47500	50000	52500

Median Household Income 1-Mile Ring and 3-Minute Drive-Time

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	1	61211	61211	0.00	0.978
Error	44	3.502E+09	79591266		
Total	45	3.502E+09			

Individual 95% CIs For Mean
Based on Pooled StDev

Level	N	Mean	StDev	Individual 95% CIs For Mean Based on Pooled StDev			
MEDIAN H	23	48642	9104	(-----*-----)			
3-MIN ME	23	48569	8735	(-----*-----)			
Pooled StDev = 8921				45000	47500	50000	52500

Example

This is a sample of the demographic output from Site To Do Business and their current ESRI platform.

This output required about 10 seconds to input the street address and select the drive times. The results were available in a PDF file in less than three minutes.