

RETAIL DEVELOPMENT AND DOWNTOWN CHANGE: SHOPPING MALL IMPACTS ON PORT HURON, MICHIGAN

Amie Dickinson

Site Location Research Analyst, Real Estate Department, Advance Auto Parts

Murray D. Rice

Assistant Professor, Department of Geography, University of North Texas

***Executive Summary.** Retail geography is a research field with applied linkages to the interests of businesses and governments alike. This paper examines Port Huron, Michigan as a Midwestern city whose retail experience provides an opportunity to observe the direct impacts of shopping mall development on an existing regional matrix of service activity. Local governments and urban planners will find this case study to be of interest with regards to mall impacts when concerned with mitigating the impacts of new retail developments in similar urban situations. Our study shows that certain business types grew in the downtown area of Port Huron following the development of a suburban mall in the region, and indicates that such business types could become the focus of revitalization programs to keep original business districts thriving. Business owners and consultants can benefit from a greater understanding of the dynamics reshaping the retail landscapes associated with new shopping developments.*

The location and distribution of businesses within an urban area is a fundamental factor influencing consumer satisfaction, business profitability, and the overall growth and prosperity of cities. The primary aim of this research to track retail location change during a period of particularly important shifts in a city's local business patterns: the time following a major suburban retail development. The venue chosen for this study, Port Huron, Michigan, is a small, Midwestern city with a relatively simple urban form centered on a single, dominant downtown. According to the U.S. Census Bureau, in the year 2000 the city of Port Huron contained a population of approximately 32,338 people, and covered an area of 12.2 square miles (31.7 km²). The closest major U.S. urban area to Port Huron is Detroit, which lies 63 miles (100 km) to the southwest.

The only major mall in the Port Huron region opened in the late 1980s, on the city's northern periphery. Before suburban mall development, the city's single central business district dominated local retail service provision, with most of the major stores and services in the region being located in or near the city's downtown. The simple form of the city and the straightforward nature of the retail development the city encountered provide the opportunity to observe and better understand the impacts brought on by new mall development. The investigation of geographic change within the Port Huron retail and service community is a small step toward a better understanding of the issues that governments and businesses must manage as business activity leaves the traditional urban core.

It is clear that the introduction of a new mall was the beginning of a period of tremendous change for Port Huron's retail landscape. Birchwood Mall, a regional mall of approximately 840,000 square feet, was built in Fort Gratiot Township adjacent to Port Huron's northern city limit. The construction of the mall in 1987 led us to select 1986 (just before the mall opening) and 2006 (20 years following) as reference years in an attempt to gauge the spatial and temporal characteristics of the impact of this mall development on the regional retail environment.

It is obvious that the introduction of a new regional shopping center to a small city provides an impetus for many existing businesses across the city to relocate or close. However, what is not obvious in such a situation is a ready identification of the specific types of retail and service activities that might be most impacted by mall development. As well, it should be recognized that similar mall developments in larger centers with multiple retail districts lead to complex business shifts that can be difficult to interpret. Thus, the simplicity of the Port Huron situation can be advantageous for analysis of retail change, both as an input to decision making for small cities, and as a catalyst for continuing research in more complex larger-city situations. This study contributes to the applied retail geography literature by analyzing locational change by retail subtype and by focusing on a small city with a simple urban structure. Even with Birchwood Mall, Port Huron's retail landscape includes only two key focal points: the mall and the pre-existing downtown.

Background

Although a body of previous research relates to this study, the most directly-related of these works are not recent. Schapker (1956) studied the effect of the introduction of a new shopping center on businesses located in established neighborhoods in a city. In this previous, parallel research, the new shopping center and the older retail districts under study served the same customers, much like Birchwood Mall and the older CBD both serve Port Huron and vicinity. Schapker's study concluded that certain types of retail currently serving the city felt the effects of a new shopping center more drastically than others. His findings were in line with the findings of this study showing men's and women's clothing stores and shoe stores felt the greatest impact after shopping center development. Schapker's research is dated, but is still a valuable precedent for the analysis presented here.

Four years later, Pratt and Pratt (1960) also studied the impact of regional shopping centers on existing communities. They concluded that regional shopping centers do have an impact on surrounding areas up to a ten minute driving distance. Their study, however, was focused on two shopping centers and their influence on suburban patronage in the New York metropolitan area. Certainly, a wide variety of published work since the 1960s has addressed retail location and shopping behavior as well as the changing location and development strategies of malls and retail chains (Ghosh and McLafferty 1987; Guy 1994; Graff 2006; Lorch and Hernandez 2008; Hernandez *et al.* 2008), but none of the research published in recent years has come back to the theme of retail development impacts in a regional setting, and certainly none in a small-city setting as in Port Huron.

Updated findings in this research field are needed given the many changes in the retail sector since the 1960s, such as shifts in consumer shopping habits, expansion of goods and services provided, and the ongoing evolution of retail formats to include "big box" stores and "power centers" (Hernandez and Simmons 2006; Dumbaugh and Rae 2009). Viewed in this context, the present study fills only one part of a broader research need. Indeed, this study can provide only partial insight because the current focus is necessarily limited to the impacts of retail development that occurred in the 1980s. Power center retail formats, with their larger "category killer" stores

and different shopping dynamics, likely have impacts that are different than those of a “traditional” shopping mall such as Birchwood Mall. However, within the limitations of what is currently possible for a long-term impact analysis, this study provides an indication of some of the important trends and issues surrounding suburban retail development in a small-city setting.

Methodology

Information on all retail and service businesses in the Port Huron region for 1986 was obtained from the St. Clair County *Yellow Pages* telephone directory. Counterpart information for 2006 was obtained from a Claritas business database provided by Buxton Co., a national retail consulting firm based in Fort Worth, Texas. To identify business types within the retail sector (e.g., book stores as a sub-type within the retail sector), we established a simplified classification structure based on the *Standard Industrial Classification* (SIC) system, to facilitate the analysis for all retail businesses in the region for 2006 (see Table 1). SIC codes are a government-issued multiple-digit classification system used for many business analysis applications. We used the two-digit level of the SIC system as the basis for our Port Huron retail classification system. We obtained SIC identifiers directly from the Claritas source for 2006, and translated this into the classification system for this database. Actual SIC identifiers were used in this study for questions pertaining only to the 2006 database. Due to a smaller sample size within the geographic region of these questions, the SIC identifiers were direct aids in the accuracy of the analysis of so few businesses.

Table 1: Retail and service classification system used for the 2006 dataset

Business Category Name	SIC Codes Included
Home Improvement	52, 57
General Merchandise and Food Stores	53, 54
Apparel and Accessory Stores	56
Eating & Drinking Places	58
Miscellaneous Retail	59
Financial Services	60, 61, 62
Personal Services	70, 72
Business Services	73
Automotive Dealers and Repair Services	55, 75, 76
Entertainment	78, 79

Although SIC codes were not available directly from the Yellow Page directory source for the 1986 dataset, the identification and naming conventions used there are similar to those used in the 2006 dataset. Our use of the classification system summarized in Table 2 aimed to create as much consistency as possible in the general categories used in the analysis for the two study years. Table 2 shows that the 1986 and 2006 classification systems are close, but not exact, counterparts. For example, in the 2006 dataset Hotels & Motels (SIC 70) are combined with Personal Services (SIC 72) to create a general Personal Services category. The two-digit level of the SIC system used on the 2006 dataset is the basis for all of the categorization. Hotels & Motels from the 1986 dataset did not fit correctly into any other two-digit SIC category that was present in 2006 (i.e., Financial Services, Miscellaneous Retail, or Home Improvement).

Table 2. Retail and service classification system used for the 1986 dataset

Category for 1986	Closest 2006 Counterpart
Apparel	Apparel and Accessory Stores
Auto	Automotive Dealers and Repair Services
Convenience Store	General Merchandise & Food Stores
Department Stores	General Merchandise & Food Stores
Entertainment	Entertainment
Financial Services	Financial Services
Food & Drink	Eating & Drinking Places
Hotels	Personal Services
Service	Business Services
Specialty Stores	Miscellaneous Retail

We acknowledge that some potential issues could be caused by the use of different data sources for the 1986 and 2006 study years. In particular, we would expect the Claritas database to be the more comprehensive of the two. However, given a limited data collection budget that allowed for the use of Claritas data for only the 2006 study year, we believe that the use of the Yellow Page dataset for 1986 represents an acceptable alternative. While some businesses may choose not to have telephone service or to be omitted from the local Yellow Pages directory, these must be very unusual businesses indeed. Certainly, the overwhelming majority of service-oriented businesses analyzed here also have Yellow Page listings. We are confident that our analysis has captured all of the most important businesses that serve the Port Huron region.

The two primary geographic areas within the region formed a focus for this research: Port Huron's traditional CBD and a one-mile radius zone around Birchwood Mall. The purpose of the analysis of these two particular areas is to identify change in retail type within the CBD associated with the opening and ongoing operation of Birchwood Mall. The analysis focuses on recognizing influence the mall may have had on retail location patterns. This is accomplished by examining differences in location patterns and the composition of the retail community between 1986 and 2006.

St. Clair County, within which Port Huron is located, was broken into block groups for analysis. Block groups are relatively small geographic zones defined by the U.S. Census. These areas are defined by population and normally contain between 600 and 3,000 people (United States Census Bureau 2005). Due to the retail nature of this manuscript, only those block groups that contain five or more businesses were considered in the analysis, regardless of population. All other block groups in the county were eliminated to avoid incorporating primarily residential communities or other non-business zones in the analysis.

The "relative entropy" statistic is used within this study to identify shifting retail patterns within the CBD. Such a measure provides a business diversification index whose changing values can be monitored over time, thereby providing a means of identifying neighborhoods that have undergone the greatest retail change between 1986 and 2006. Rice (2004, 247), for example, employed the relative entropy statistic to measure "diversification in an economy" when analyzing the sectoral composition of rapidly-growing businesses. In a similar manner, the present study uses relative entropy to identify shifts in business diversification that have occurred within the City of Port Huron and its CBD over the study period. In this context, the study calculated relative entropy on a scale ranging from 0 (indicating no diversification, or businesses

in only one sector of the economy) to 100 (indicating total diversification involving businesses in all possible economic sectors).

To supplement its examination of business diversification, we have also examined the change in the primary businesses located in each block group. It is important to recognize “business diversity” and “primary business” as two distinct concepts. While diversity addresses the range of business types present in a community, examination of primary business type focuses on the specific business types (such as gas stations or restaurants) that are most numerous in an area. It is possible for one of these measures to change while the other does not. For example, an area might remain highly diversified but have its primary business change from one business type to another. Both dimensions of the business community were examined to provide a comprehensive view of the business change that has occurred in Port Huron and its CBD.

Given this background, the goals of the present study are twofold. First, we aim to provide an analysis of the impacts of shopping center development updated to the 1986-2006 period, with a concentration on the fundamental changes occurring in small cities seeing new, decentralized retail development. Second, we aim to identify store location strategies throughout the urban region that responded to the change in business environment created by the opening of Birchwood Mall. Our analysis focuses specifically on the evolving retail location choices associated with new retail development, as opposed to an examination of consumer shopping behavior.

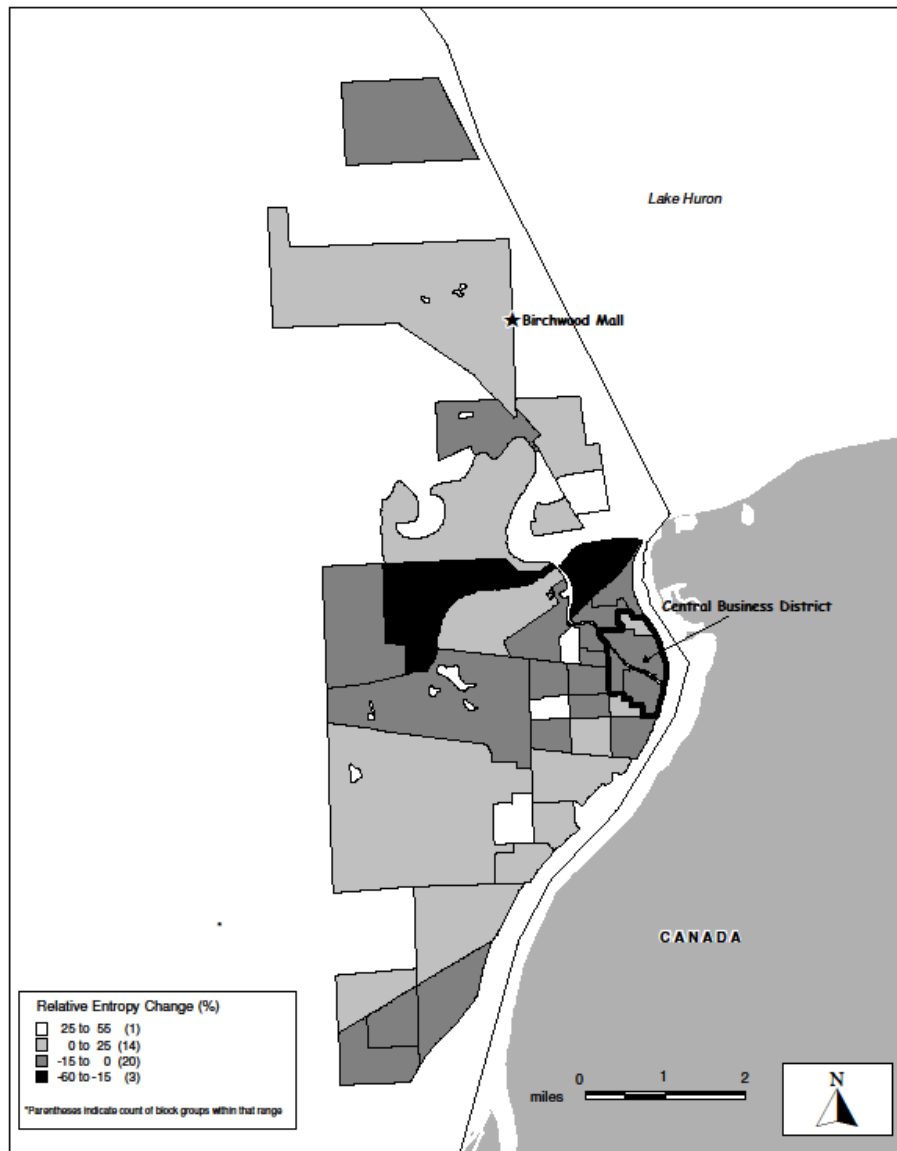
Findings

Area Retail Diversity. Change in retail diversification as implemented here is determined by calculating the difference in relative entropy values for each block group from 1986 to 2006. Figure 1 displays the block groups in question and their percent of relative entropy change. The entire Port Huron region as a whole, and the Port Huron CBD individually, had mean relative entropy (“retail business diversification”) values ranging between 55 and 65 percent in both 1986 and 2006. Figure 1 shows the locations of both the CBD and Birchwood Mall.

Analysis of variance (ANOVA) was used to test the statistical significance of any change observed in business diversification in the region. To be thorough in this analysis, we implemented ANOVA in three geographic areas: (1) all block groups throughout Port Huron, (2) in only those block groups falling inside the Port Huron CBD, and (3) in the block groups falling outside of the CBD. In all three cases, ANOVA showed that there was not a significant difference in business diversification levels between 1986 and 2006¹. In other words, the levels of diversification in the retail business community in the three geographic components of the city defined above did not change significantly since the opening of Birchwood Mall. This indicates that while the mall has certainly had an impact in terms of shifting the geography of retail activity within the city, the CBD has been able to hold onto an overall range of business activity that is comparable to the range of businesses it hosted before the Birchwood mall opening.

One important observation arising from Figure 1 is that Birchwood Mall’s block group experienced an increase in relative entropy (or retail business diversification) over the 1986-2006 period, while the CBD experienced an overall decrease in diversification. The directions of these changes are what might be anticipated, with the downtown becoming marginally less diverse, and the mall attracting an increasing range of business types to its area. Importantly, these changes are not statistically significant, meaning that the changes evident from 1986 to 2006 are minor in terms of their impact on the breadth of the business community. From the perspective of the

Figure 1: Relative entropy change (1986-2006)



CBD, it is encouraging to see that Port Huron’s downtown has been able to minimize its loss of business diversity in the face of new suburban competition.

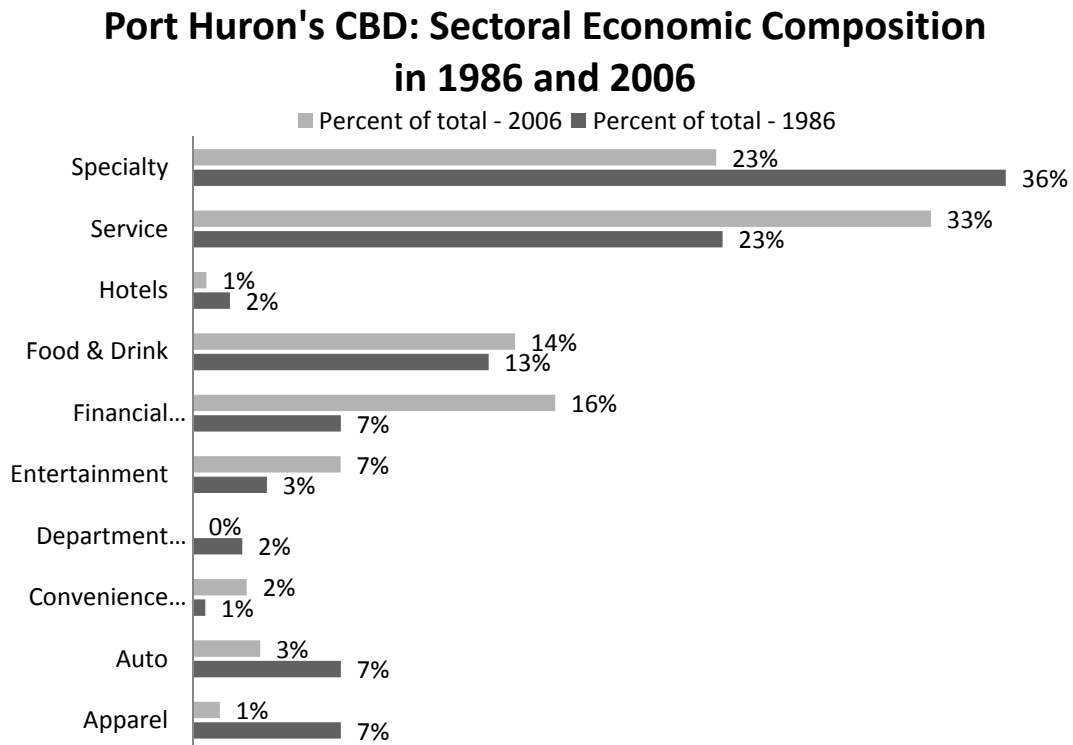
Central Business District. Although a significant change in the *overall* business mix is not evident in the region or CBD, it is still possible that individual retail specialties (such as bookstores or barber shops) have seen important changes in their location and geographic distribution. Further, even though the CBD has maintained a broad range of retail types inside its boundaries, the individual business types that are most important to the area may have changed (for example, one important business type leaves the CBD and another comes in that was formerly not as important). To investigate these kinds of changes, our analysis sought to identify the specific business types that have individually seen important changes within the CBD. In

other words, are there business types that on their own have seen a drastic change in CBD count between 1986 and 2006?

Figure 2 summarizes the primary 1986-2006 changes in the CBD retail community by major business typeⁱⁱ The primary business in the CBD in 1986 was “Specialty Stores,” with a count of 57 firms. “Specialty Stores” were seen as any store offering a specific product, rather than an array of products (such as mattress stores and shoe stores). This type of retail saw a -46 percent change, resulting in a count of 31 in 2006. By 2006, the primary business had become “Service Businesses,” which saw an increase of 39 percent from 1986. “Service Businesses” included auto repair shops and photography stores. Other key business types that saw important changes include: “Department Stores” (-100 percent in business count in stores such as JCPenney and Sperry’s which house multiple departments), “Apparel Stores” (-83 percent in stores tailored specifically to men’s or women’s clothing), “Convenience Stores” (+300 percent such as typical convenience stores or drug stores), “Financial Services” (+125 percent such as banks), and “Entertainment Venues” (+83 percent such as bowling alleys or theatres).

Chi-square testsⁱⁱⁱ were used to identify a statistically-significant shift in primary business within the CBD between 1986 and 2006. Results from this test lead to the conclusion that there is a highly significant difference in the CBD’s primary business type between 1986 and 2006^{iv}. Along with a change in retail type, the overall count of retail businesses within the CBD decreased marginally from 183 (1986) to 168 (2006).

Figure 2. CBD Business category counts



It is clear from these results that important changes in business type have indeed occurred in the CBD. However, to repeat an earlier point, the overall range of business types represented in the downtown in 2006 was similar to 1986. This research has identified a shift in retail environment within the CBD by recognizing a new primary business after the introduction of a regional shopping center. At the same time, however, the CBD has been able to maintain its previous range of retail by upholding its original level of diversity.

Birchwood Mall. This last component of the analysis focuses on the location of retail services by business type in the area surrounding the mall. These results examine the degree to which the mall has had a tangible impact on the location of specific business types. The aim of this portion of the study is to determine if the businesses located at various distances from Birchwood Mall come from a different mix of retail and service types than the group of businesses located either at shorter or longer distances from the mall.

To accomplish this, we examined the businesses located in three concentric rings from Birchwood Mall as of 2006:

- from the mall up to 0.20 miles from the mall (including the mall itself)
- from 0.21 up to 0.60 miles from the mall
- from 0.60 up to 1.00 mile from the mall

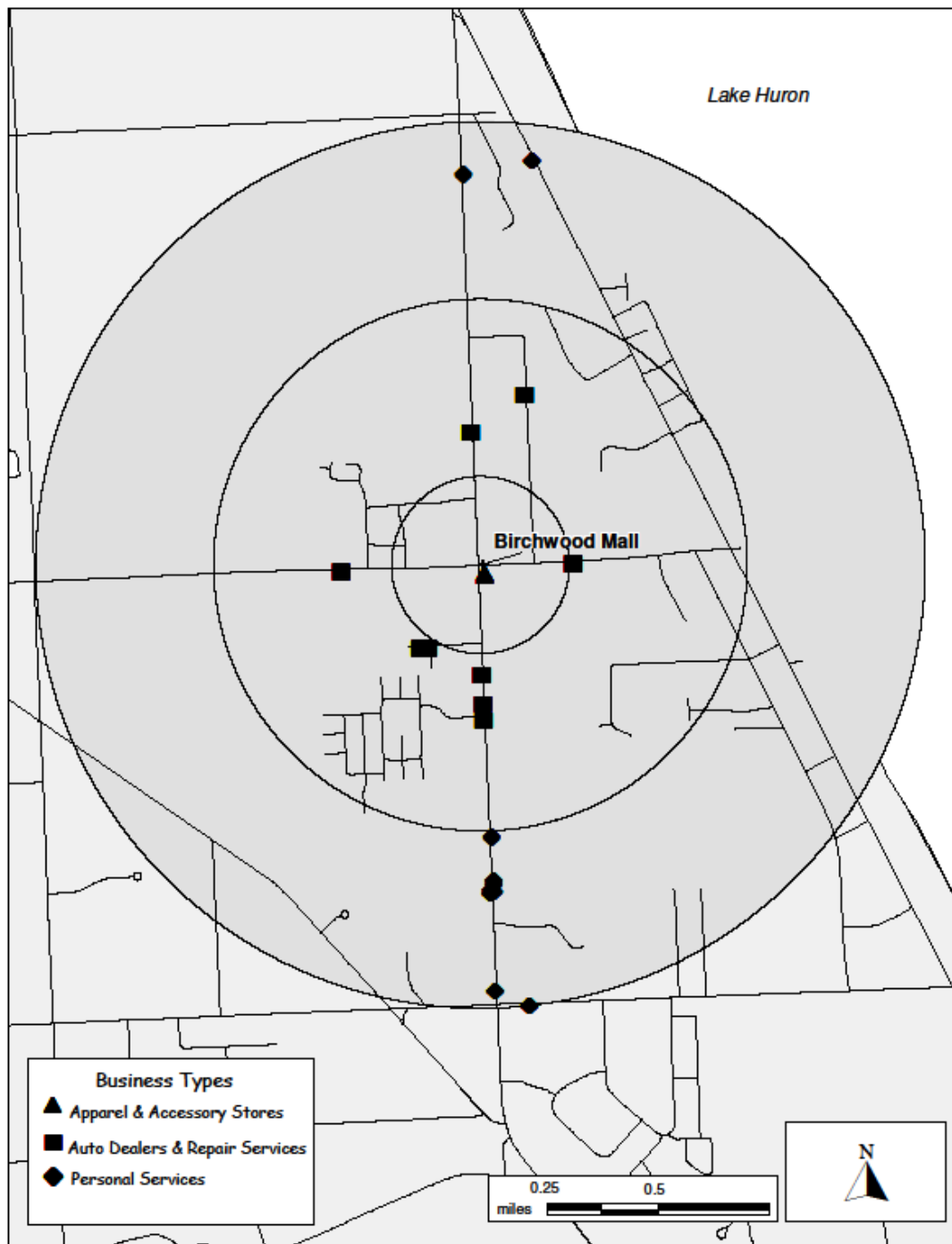
Table 3 displays the top three business types within each ring and their counts, while Figure 3 provides a further, visual representation of business locations and types within each of the three rings. Table 3 shows that apparel and accessory stores are most prominent in the mall and its 0.20-mile radius, while automotive retailing is prominent in the next (0.21-0.60 mile) radius. Personal services, such as dry cleaners and hair salons, are most prominent in the most distant radius (out to 1.00 miles). Eating and drinking establishments also play an important role in both of the outer rings, but not in the mall itself. Chi-square testing of the business data for each ring (test statistic value of 68.46, p-value of 0.000) indicates a significant difference in store type between each of the concentric rings.

Table 3: Top three businesses within specified distances from Birchwood Mall (2006)

	#1 Ranked Business Type	#2 Ranked Business Type	#3 Ranked Business Type
0.00-0.20 Miles	Apparel & Accessory 35 Stores	Miscellaneous Retail 25 Stores	General Merchandise & Food Stores / Personal Services 11 Stores
0.21-0.60 Miles	Auto Dealers & Repair Services 12 Stores	Eating & Drinking Places 10 Stores	Personal Services 8 Stores
0.60-1.00 Miles	Personal Services 13 Stores	Eating & Drinking Places 12 Stores	Miscellaneous Retail / Auto Dealers & Repair Services 11 Stores

While caution should be used in generalizing the specifics of these results beyond the local setting of Birchwood Mall, it is important for private and public-sector officials to incorporate in their plans the influence that large retail developments exert beyond their property boundaries. Our results provide an indication of the business types that might be expected to be attracted to a new retail development and its immediate vicinity.

Figure 3. Map of primary retail locations surrounding Birchwood Mall, 2006



Conclusions

The structure of Port Huron's downtown area has shifted in composition while retaining its retail diversity. Certain business categories have been greatly influenced by the opening of the mall, for example, department stores and apparel stores have largely exited the downtown area. However, other retail types (financial services, convenience stores and entertainment venues) have thrived and now fill the empty spaces left by mall-bound retailers. Overall, the downtown of Port Huron has maintained a level of retail diversification and vitality comparable to its pre-mall state, although the function of the city's central area has been fundamentally altered.

Changes relating to the development of Birchwood Mall were also addressed. In this suburban context, the study results demonstrate the business types that have been most attracted to Birchwood Mall itself (apparel stores), as well as to the mall's general vicinity (automotive-related retail, eating and drinking establishments). These findings provide some indication of what kinds of businesses work well in a suburban retail setting and have little hope of surviving downtown given suburban location opportunities. In this dimension, our findings parallel those of Schapker (1956), with apparel stores being the most affected in Port Huron's downtown.

For many urban areas, it is the ongoing fortunes of businesses located in the historic downtown area that provide the greatest concerns for local governments and business communities. In Port Huron's post-mall era, the CBD's loss of department stores and dramatic gains in financial services and entertainment point to a re-shaping of the city center's function and influence in the community. The movement evident in the shifting retail landscape of the downtown area reflects a gradual process, with department stores and clothing shops moving within the first five years of mall development. This gradual movement helped the city cope with the shifting primary retail within the downtown area. Port Huron's experience can provide a partial model for expectations in other small cities. Central city development and business recruitment efforts can focus on business types with a reasonable expectation of success and can anticipate relocation on the part of other businesses. Knowing which retailers can continue their business downtown in a context of suburban development can help city officials plan to keep historic CBDs dynamic and important for the entire urban area.

An area's retail landscape can be altered with the introduction of major retail centers. City planners and local officials should be aware of the effects that a mall can have on a thriving business center. In this way, Port Huron's experience could be viewed as an example of how business communities can evolve, specifically in a small-city context. Business owners may use the results provided by this study to guide their location strategies in a changing urban environment. Certain business types, such as apparel and automotive retailers, were clearly compelled to relocate from the CBD with the development of suburban retail in Port Huron. Alternately, some business types such as entertainment and finance found increased opportunities in Port Huron's CBD with increased suburban development, so an awareness of the strengths of both kinds of location types is important.

The introduction of a regional shopping mall has increased business opportunities, encouraged greater volume of tourism, increase job creation, and increased overall revenue for the city of Port Huron. City officials should also be aware of decreasing business counts in historical shopping areas and initiate projects and activities to keep original CBDs alive. We have directly identified the businesses best targeted for downtown revitalization and the business types most likely to relocate to suburban developments.

Future research in this area could focus on any of a number of related issues. To what degree are the findings presented here consistent with retail impacts in large urban areas? How does new retail development impact surrounding business areas in a sprawling suburban area with no prominent downtown? The continued evolution of retail formats also provides some opening for further research (Hernandez 2003, Graff 2006). Does the opening of a new supercenter or big-box shopping complex impact the businesses in a city differently than did mall developments of the previous decades? While the traffic generated by such complexes might be comparable to traditional malls, the transition to larger store sizes and the specialization inherent in the large stores might mean that the impacts of these complexes are changing as well. Additionally, the transformation of former traditional malls into modern big-box complexes presents an additional venue for retail impact studies (Lorch and Hernandez, 2008). How does mall impact evolve over time with the aging of a retail format and its associated retailers? Applied researchers in retail geography and related fields can provide insight and guidance to private and public-sector decision makers by continuing to investigate these and related questions.

References and further reading

- Dumbaugh, E., and R. Rae. (2009) "Safe Urban Form: Revisiting the Relationship Between Community Design and Traffic Safety." *Journal of the American Planning Association* 75(3), pp. 309-329.
- Ghosh, A. and S. McLafferty. (1987). *Location Strategies for Retail and Service Firms*. Lexington Books. Lexington, MA.
- Graff, T. (2006). "Unequal Competition Among Chains of Supercenters: Kmart, Target, and Wal-Mart." *The Professional Geographer* 58(1), pp. 54-64.
- Guy, C. (1994). *The Retail Development Process*. Routledge. London.
- Hernandez, T. (2003). "The Impact of Big Box Internationalization on a National Market: The Case of Home Depot in Canada." *The International Review of Retail, Distribution and Consumer Research* 13(1), pp. 77-98.
- Hernandez T., T. Erguden, and M. Svindal. (2008). *Power Retail Growth in Canada and the GTA: 2007*. CSCA Research Letter 2008-01. Ryerson University. Toronto.
- Hernandez, T., and J. Simmons. (2006). "Evolving Retail Landscapes: Power Retail in Canada." *The Canadian Geographer* 50(4), pp. 465-486.
- Lorch, B.J., and T. Hernandez. (2008). "The Transformation of Shopping Mall Space in Canada: An Analysis of Selected Leasing Site Plans Between 1996 and 2006." *Geography Research Forum* 28, pp. 21-41.
- Pratt, S., and L. Pratt (1960). "The Impact of Some Regional Shopping Centers." *Journal of Marketing* 25(2), pp. 44-50.
- Rice, M.D. (2004). "Regional and Sectoral Growth in Canada's Emerging Economy." *Canadian Journal of Regional Science* 27(2), pp. 237-254.

Schapker, B. L. (1956). "Effect of a Planned Shopping Center on an Older Center Serving the Same Area." *Journal of Marketing* 21(1), pp. 71-73.

U.S. Census Bureau. (2005). Census Block Groups Cartographic Boundary Files Descriptions and Metadata. Retrieved June 20th, 2010:
http://www.census.gov/geo/www/cob/bg_metadata.html#gad

The authors

Amie Dickinson is an applied geographer who works as a Site Location Research Analyst for Advance Auto Parts Real Estate Department. Amie acquired a background in physical geography and Geographic Information Systems while earning her bachelor's degree from Northern Michigan University in Marquette, MI. Amie's master's degree in Applied Geography from the University of North Texas formed the original thesis to this research titled "A Spatial-Temporal Analysis of Retail Location and Clustering: A Case Study of Port Huron, MI". Her current position at Advance Auto Parts requires demographic and retail research to support sales predictions for new store expansion.

- amie.dickinson@advance-auto.com
- 540 561 3461

Murray D. Rice is an applied economic geographer who teaches at the Department of Geography, University of North Texas. Dr. Rice's research focuses on understanding the factors that shape the evolving location of business activities and interurban business linkages in the economies of the United States and Canada. At its most basic level, his research program focuses on the timeless issue of regional economic variations and inequalities: some regions have wealth and economic opportunity, and are good at generating more, while other regions lack these same attributes and are looking for ways in which they might improve. His studies include investigation of the location and distribution of corporate headquarters of the largest parent and subsidiary firms, as well as the evolving and dynamic groups of rapidly-growing and rapidly-declining firms that form the leading edge of change in the North American economy.

- rice@unt.edu
- 940 565 3861

Notes

ⁱ The ANOVA results for the three cases were: p -value=0.863 with 90 degrees of freedom (entire region), p -value=0.994 with 6 degrees of freedom (CBD only), and p -value=0.890 with 84 degrees of freedom (entire region outside of the CBD).

ⁱⁱ For the purposes of Figure 2, the broad sectoral categories used in 2006 were further categorized into classes that directly compare to the business classifications used in 1986. For example, "department stores" were broken out from the "general merchandise & food stores" category for 2006.

ⁱⁱⁱ The chi-square test is a statistical method used to determine whether there is a significant difference between two sets of results (often, the results that are observed and those that are expected). In the present study, we employ the chi-square test to probe for the existence of a difference between the business types present in 1986 and 2006.

^{iv} Chi-square results: $\chi^2=27.1903$, p -value=0.0013