

Trade Centers of the Upper Midwest
1999 Update

Final Report

Prepared by
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Center for Urban and Regional Affairs

June, 1999

The content of this report is the responsibility of the author and is not necessarily endorsed by CURA.

Acknowledgements

The financial support provided by the Office of Investment Management of the Minnesota Department of Transportation is gratefully acknowledged.

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Background

More than 35 years ago, *Trade Centers and Trade Areas of the Upper Midwest*¹ described the system of central places that characterized an important region of the U.S. Geographically, its definition centered on Minnesota, but the region also included Montana, North and South Dakota, and part of Wisconsin. Its taxonomy of trade centers defined an eight-level hierarchy of places, with metropolitan areas at the top and hamlets at the base. This taxonomy has since proved valuable to policy makers and researchers.

Using the 1963 study as a starting point, another report, *Trade Centers of the Upper Midwest: Changes from 1960 to 1989*,² increased the scope and updated the picture of what was happening economically in the region. Underpinning its analytical model were computerized data sets describing a seven-state region (Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota, and Wisconsin). These data, acquired from outside sources, detailed types of business establishments and demographic information, all collected at the zip code level.

When aggregated and analyzed, the data described a complex system that was continuing to evolve. Dramatic economic and spatial changes had occurred across the region, and the report portrayed these changes in several

¹ John R. Borchert and Russell B. Adams, *Trade Centers and Trade Areas of the Upper Midwest*, Upper Midwest Economic Study, Urban Report No. 3, CURA, University of Minnesota (1963).

² Thomas L. Anding, John S. Adams, William Casey, Sandra de Montille, and Miriam Goldfein, *Trade Centers of the Upper Midwest: Changes from 1960 to 1989*, Center for Urban and Regional Affairs, Publication No. CURA 90-12, University of Minnesota (1990).

different ways: as measurable shifts in the importance of particular cities and towns, as changes in the role of entire levels in the overall system, and as maps reflecting movements toward centralization.

Models of this sort can be valuable in documenting distributions of economic activity across a region and describing the importance of individual cities or groups of cities. Beyond that, gaining insight into the changing structure of towns and cities—as they grow or shrink, take on new roles, and become more or less economically significant in a larger, overall system—can also be beneficial.

There is no single way to assess the robustness of a place or a region in its many dimensions, regardless of how many measures are collected and analyzed. The method employed here, though, goes beyond simply looking at population to assessing as well levels of economic activity based on the number of local businesses and their mix.

This Update—Using 1998 Data

Working in cooperation with the Minnesota Department of Transportation (MnDOT), the University of Minnesota's Center for Urban and Regional Affairs (CURA) acquired 1998 demographic data from the Claritas Corp. and 1998 business data files from Dun & Bradstreet. These served as a starting point for the 1999 update to the trade centers structure documented in the 1990 analysis. Throughout the study, references to specific data refer to these 1998 data sets.

MnDOT's primary interest in the new study is in identifying those Minnesota trade centers serving relatively large geographic areas (i.e., Levels 0 - 3); consequently, the analysis does not focus on settlements at the bottom of the trade center hierarchy (i.e., Level 6 Convenience Centers and Level 7 Hamlets). Nevertheless, the data acquired allowed analysis of all levels of the hierarchy for the entire seven-state study area. Table 1 identifies all eight levels of the hierarchy, shows the number of cities at each level, and lists example communities in each level.

Table 1

Examples of Regional Trade Center Communities

Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0
Hamlet	Minimum Convenience Center	Full Convenience Center	Partial Shopping Center	Complete Shopping Center	Secondary Wholesale/Retail Center	Primary Wholesale/Retail Center	Major Metro Area
Number of Cities							
2036*	1049*	260	239	132	103	18	8
Example Cities							
Brewster (MN)	Goodhue (MN)	Mahnomen (MN)	Blue Earth (MN)	Wahpeton (ND)	Bemidji (MN)	Duluth (MN)	Twin Cities (MN)
Bigelow (MN)	Montrose (MN)	Central City (IA)	Eldridge (IA)	Montevideo (MN)	Mankato (MN)	Fargo (ND)	Milwaukee (WI)
Frost (MN)	Tower (MN)	Flandrau (SD)	Spooner (WI)	Livingston (MT)	Iowa City (IA)	Cedar Rapids (IA)	Des Moines (IA)

*1989 Data

The methodology produces a hierarchy based on population and the numbers and types of business establishments. Changes over time are measured by comparing indices established in previous studies (1963 and 1990) with those derived from the current effort.

The methodology uses nine variables to determine the level in the hierarchy of each community in the seven states (see Table 2).

Table 2

Demographic and Business Variables

Variable	Description
Population	Population of Regional Trade Center zip code(s)
Construction Establishments	Number of establishments in SIC 15, 16, 17
Commercial Service Establishments	Number of establishments in SIC 70-80, 82-84, 87-88
Manufacturing Establishments	Number of establishments in SIC 20-39
Professional Service Establishments	Number of establishments in SIC 60-67, 81, 86, 89
Retail Establishments	Number of establishments in SIC 52-59
Transportation Establishments	Number of establishments in SIC 41-49
Wholesale Establishments	Number of establishments in SIC 50 and 51
Total Establishments	Sum of all establishments

Note: SIC codes 7, 8, 9, 10, 13, and 14 were not included in the study

Data Acquisition and Methods

The 1998 Dun & Bradstreet data contained nearly 300,000 individual records. Each record details the number of businesses with a particular four-digit Standard Industrial Classification (e.g., “2011—Meat packing plants,” “5945—Hobby, toy and game stores,” and “8062—General medical and surgical hospitals”) located in a specific zip code across the seven-state study area. Their data records also indicate the sizes of business establishments reported, based on the number of employees at the site. Unfortunately, a high proportion of the data reports size of business as “unavailable,” so size of firms could not be considered in this analysis.

Claritas Corporation supplied a data set describing each zip code in the United States in terms of selected demographic variables. This data set also included boundary information for each zip code, allowing the use of mapping software programs.

The approach in using these new data sets was to update the previous models in a manner as consistent as possible with the analyses of 1963 and 1990. In other words, this work does not introduce, or attempt to introduce, new methodologies into the process of determining the hierarchy of trade centers. At the same time, it has been a priority to document carefully methodological and operational issues as they arose and to prepare a set of guidelines to assist future researchers with any subsequent analyses—whether next year or a decade from now.

Data Operations and Analysis—1999

At a very general level, there are six steps in dealing with the new data sets. Each step noted below has, in most instances, numerous sub-steps.

- 1) **Derive Zip Tables**—Zip code master tables for the Upper Midwest were derived from the U.S. data files supplied by Claritas.
- 2) **Validate Establishment Records**—Dun & Bradstreet’s business establishment records were examined for legal zip codes as determined above. Other integrity checks on these records were carried out as

well. The number of business establishments in each state in the seven-state study area is listed in Table 3.

Table 3
Number of Business Establishments by State
(1999 Update)

State	Number of Establishments
Iowa	143,713
Minnesota	216,610
Montana	47,314
Nebraska	72,703
North Dakota	34,658
South Dakota	38,842
Wisconsin	194,109
TOTAL	747,949

- 3) **Define Zip/Place Geography**—The geography of the study region was established at the zip code level, which is the lowest geographic unit at which business data are available. This process involved identifying all places in the seven states that might be made up of more than one zip code. Because zip codes are ill behaving in several respects, any or all of several factors had to be considered when making this decision.

The Postal Service name for a place is the starting point in this process of evaluating small cities and towns. Zip codes were automatically aggregated if they had the same Post Office name. A Minnesota example is Mankato, which is the Post Office name for zip codes 56001 and 56003. As zip codes do not normally follow municipal boundaries, the aggregated areas typically do not correspond to municipal entities.

In some cases, though, additional zip codes surrounding a Regional Trade Center appeared to be candidates for inclusion into the trade center, even though their postal names were different. The matter of surrounding areas was an issue whether the trade center consisted of one zip code or several aggregated ones.

The presumption was not to aggregate surrounding zip code(s) unless there was a strong case to do so. Such a strong case would be the presence of contiguous, continuous built-up areas that make one trade center hard to distinguish from a neighboring trade center with a different zip code.

Three general criteria were used to decide whether or not to consider zip codes with different Post Office names as one area:

- a. Zip codes were aggregated if the built-up area from one zip code merged with the built-up area of another zip code.
This was the primary determinant in deciding whether to aggregate zip codes. Strip development along major highways often contributes to continuous, built-up urbanized areas.
- b. Zip codes were considered for aggregation if a trade center's municipal boundary "splashed" over into a neighboring zip code AND
 - (1) the neighboring zip code represented more than ten percent of the firms in the trade center (conversely, when the number of businesses was less than five percent, the outlying zip code was **not** aggregated)AND
 - (2) the physical area of the outlying zip code was smaller rather than larger so that the centroid of the neighboring zip code was not too far from the trade center.
- c. Zip codes were less likely to be candidates for aggregation when they were separated by a river. Rivers may act as natural barriers to the free flow of cars and economic activity, especially in smaller places.

Decisions about aggregation were informed further by information derived from GIS mapping (i.e., zip code boundaries, highways, municipal boundaries, and urbanized areas) and aerial photos. Applying these decision rules in conjunction with the factors previously noted resulted in relatively few zip code aggregations; in fact, only 56 of the 760 Regional Trade Centers in the seven-state study area included two or more zip codes.

In Minnesota, the list of Regional Trade Centers with more than one zip code includes:

- Brainerd (added: Baxter)
 - Detroit Lakes (2 zip codes with Detroit Lakes Post Office name)
 - Duluth (11 zip codes with Duluth Post Office name)
 - Mankato (2 zip codes with Mankato Post Office name)
 - Moorhead (3 zip codes with Moorhead Post Office name)
 - Rochester (4 zip codes with Rochester Post Office name)
 - St. Cloud (3 St. Cloud zip codes plus Sartell, Sauk Rapids, and Waite Park)
 - Twin Cities Metro Area (157 aggregated zip codes)
- 4) **Update Control Tables**—Not all businesses are included in this model. Data records were culled on the basis of their SIC codes, and those included were aggregated into one of several groups. Data tables delineating the boundaries of the seven-county Minneapolis-St. Paul Metropolitan Area also were reexamined because zip code boundaries shift over time.
- 5) **Reduce Data**—A series of procedures starts with the preprocessed Dun & Bradstreet data. Dun & Bradstreet selects and aggregates establishment counts into one of the seven categories of SIC codes (i.e., construction, commercial services, manufacturing, professional services, retail, transportation, and wholesale). This yields the cornerstone data set on which the rating of places is carried out. The data for the 1999 update included 540,918 establishments in the 760 Level 0 - 5 Regional Trade Centers.
- 6) **Rate Places in the Trade Hierarchy**—The starting point for each community is its assigned 1990 level. Then, using the Dun & Bradstreet business data and the Claritas demographic data, averages

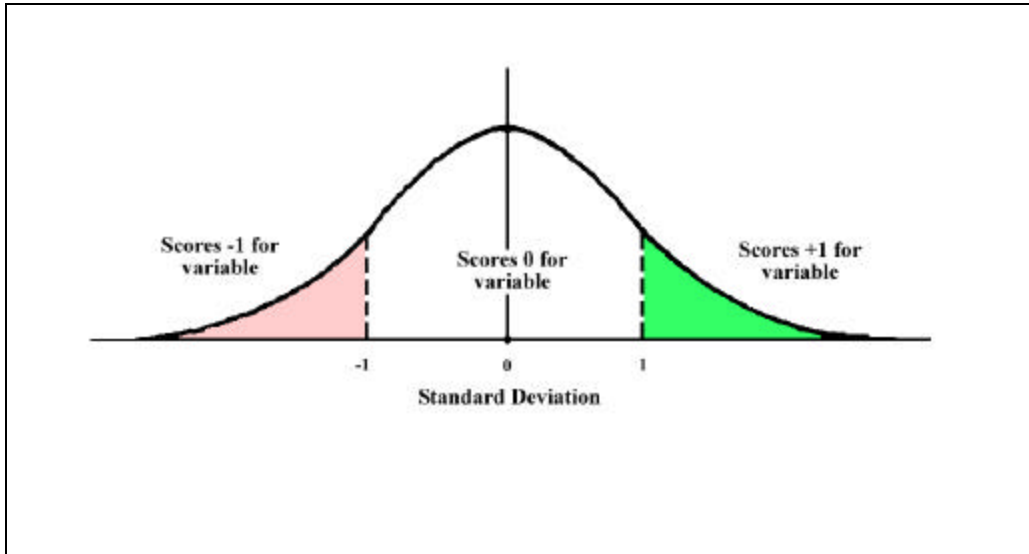
and standard deviations are calculated for each variable for each level. Each community is then compared to the average of that level in the hierarchy for each of the nine variables and given a value of -1 (if it is more than one standard deviation below the average), +1 (if it is more than one standard deviation above the average), or 0 (if it is within one standard deviation of the average).

Ashland, WI can be used as an example of this ranking system. Ashland, a Level 3 trade center, has a population of 13,287. The average population for a Level 3 trade center is 11,037, and the range of populations within one standard deviation of this average is 7,564 to 14,509. Therefore, Ashland received a score of 0 for the population category because it falls within one standard deviation of the mean. In the professional services category, Ashland's number of firms (112) is larger than the range of firms that fall within one standard deviation of the mean (71 to 111), so Ashland received a score of 1 for this category. In the wholesale category, Ashland's number of firms (16) falls below the range of firms that are within one standard deviation of the mean (17 to 36), so it received a score of -1 for this category.

If a community is more than one standard deviation above the average for at least six variables, it becomes a candidate for moving up one level. If it is more than one standard deviation below the average for at least six variables, it becomes a candidate for moving down one level. The communities that are candidates for moving up are then compared to the averages for the next highest level. If they fall within one standard deviation of the mean for at least four of the variables, they are promoted. The candidates for moving down are compared to the next lowest level. If they fall within one standard deviation of the mean for at least four of the variables, they are moved down one level. Figure 1 illustrates the scoring system.

Figure 1

Illustration of Scoring System for Each Variable



As a result of this analysis, levels for 1999 were established for all 760 cities. Table 4 shows the average population and average number of businesses for Level 0, 1, 2, and 3 Regional Trade Centers in the seven-state study area.

Table 4

Profile of Level 0, 1, 2, and 3 Regional Trade Centers
(1999 Update)

Level	0	1	2	3
Average Population	653,352	102,504	28,142	11,036
Average Number of Businesses				
Construction	1,340	281	81	35
Commercial Services	7,479	1,349	375	147
Manufacturing	1,684	217	70	29
Professional Services	6,167	1,002	255	91
Retail	4,302	906	269	107
Transportation	848	195	52	22
Wholesale	1,828	321	76	27
Total Businesses	23,649	4,270	1,178	458

Dun & Bradstreet's count of firms in specified industries was used to calculate a trade center's place in the regional hierarchy. Sales and reliable employment data might be better indicators, but comprehensive data are not available for all communities in the study area or the data are not available by zip code, the geographic unit on which the Regional Trade Center analysis is based.

Inherent in the methodology is that breadth in an economy is rewarded over depth in one or two industries. That is, it is better to have firms in a variety of industries than a few very large employers. For example, a place with an abundance of manufacturing facilities compared with others at the same level is able to advance to the next highest level only when it also has a significant retailing, wholesaling, and service presence.

The Appendix includes a state-by-state listing of Level 0 - 5 Regional Trade Centers in the study area along with their level in the 1990 study; level in the 1999 update; population; number of establishments by SIC code; and total number of establishments.

Evaluating the 1999 Regional Trade Centers System

The 1999 analysis identified 760 Level 0 to Level 5 Regional Trade Centers in the Upper Midwest (see Map 1, page 11, for Level 0 to Level 3 centers). Eight cities were classified at Level 0 (Major Metropolitan Areas), followed by 18 Level 1's (Primary Wholesale/Retail Centers); 103 Level 2's (Secondary Wholesale/Retail Centers); 132 Level 3's (Complete Shopping Centers); 239 Level 4's (Partial Shopping Centers); and 260 Level 5's (Full Convenience Centers).

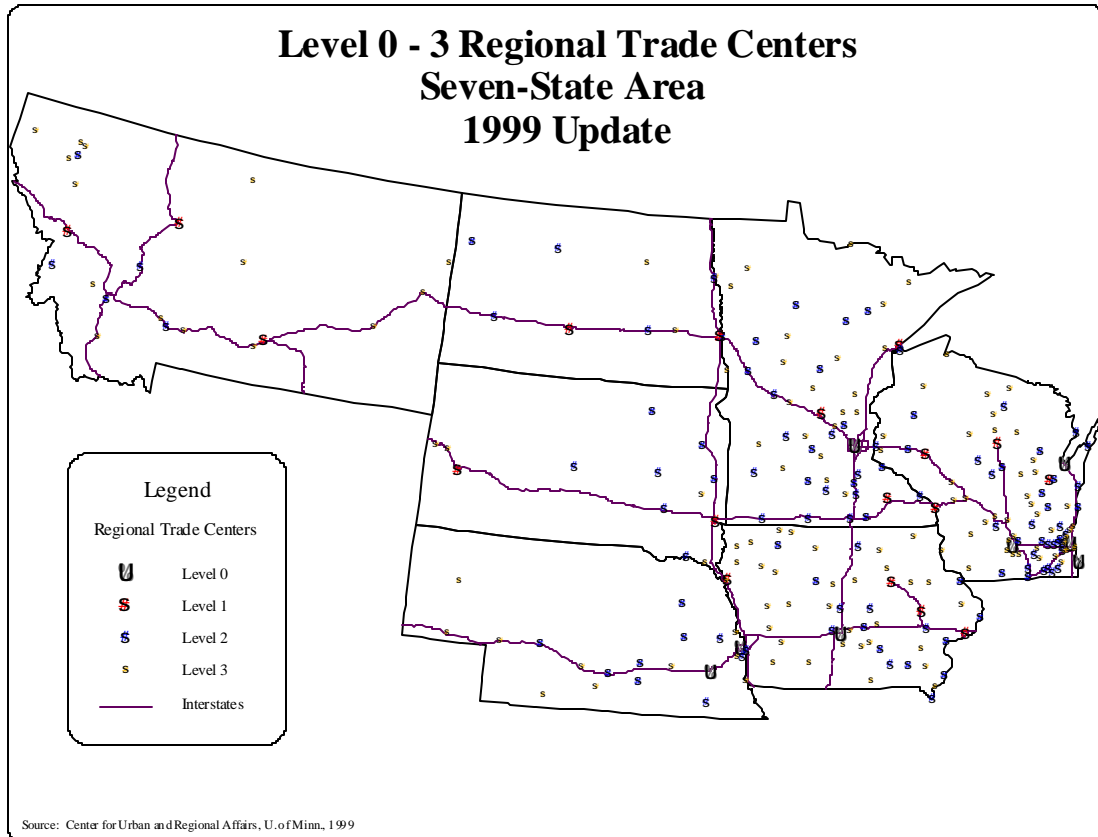
Overall, there is a stable framework of Upper Midwest places. Table 5 shows that the total number of Level 0 - 3 Regional Trade Centers has remained fairly consistent, increasing by only 16 over the nearly 40 years of the study. However, within this overall stability is the change that has occurred as specific trade centers move up or down in the hierarchy of places.

Table 5
 Number of Trade Centers by Level
 Seven State Study Area
 1963, 1990, 1999

Level	Number of Trade Centers 1963	Number of Trade Centers 1990	Number of Trade Centers 1999
Total 0 - 3	245	244	261
0	4	4	8
1	18	13	18
2	34	60	103
3	189	167	132

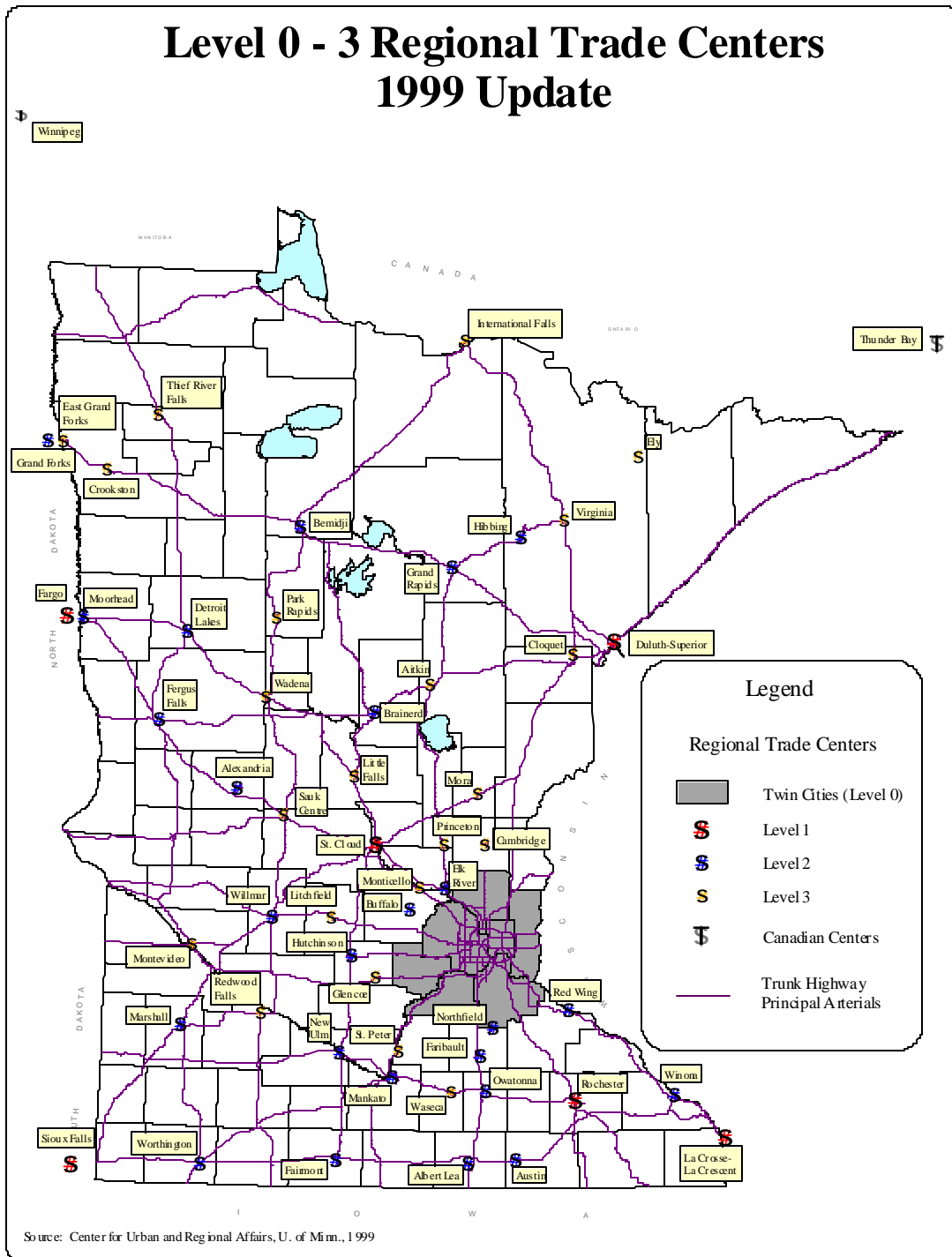
Considering the 1999 ranking of the Level 0 - 5 places identified in 1990, 525 (68 percent) remained at the level reported in 1990. Of those places changing level, 156 (about 20 percent) moved to a higher level in the hierarchy while the remainder moved down. The majority of places that moved down (88 of 94) during the nine-year period were smaller places (Levels 4 and 5). By contrast, the upward movement of trade centers in the hierarchy occurs more uniformly across the range of trade center sizes.

Map 1



The 1999 analysis identified 180 places in Minnesota at a Level 5 or higher in the hierarchy. The seven-county Twin Cities Metro Area was identified as the state's only Major Metropolitan Area. Successive levels of the hierarchy identified three Level 1's; 24 Level 2's; 22 Level 3's; 65 Level 4's; and 65 Level 5's. Map 2 (page 12) indicates the location of Minnesota's 50 Level 0, 1, 2, and 3 Regional Trade Centers.

Map 2



Over the past 40 years, the story of shifting trade center patterns in Minnesota and the Upper Midwest has involved consolidation, expansion, and growth in higher level centers. This has been coupled with erosion and loss of share in small places. The 1990 report noted:

The trade center hierarchy as a whole shifted, with higher and lower order places moving away from each other... The lowest three classes of trade centers... occupy a less important position within the regional economic system than they did a generation ago.

The current analysis suggests that in Minnesota's trade center hierarchy a good portion of the growth in cities of modest size and larger appears to be at the expense of smaller places. These findings point to a continuation—and perhaps even acceleration—of the trend previously identified. This is most evident in the robust growth observed among stronger shopping and regional centers. But because this study set aside most lower level places (i.e., the Level 6 Minimum Convenience Centers and Level 7 Hamlets), some data needed for a further analysis of this aspect of change are not available.

Potentially more fascinating in Minnesota is the proposition that the growing phalanx of Regional Trade Centers is gaining a share of its growth from the Twin Cities—the state's traditional economic super-magnet. This could be the case, at least to a limited degree. To gain an additional longitudinal view, the Dun & Bradstreet data sets used in this study were supplemented by similar *County Business Patterns* data from the U.S. Census. These data indicate that the number of Minnesota business establishments grew 17 per cent in the seven years from 1989 to 1996 (the most recent data available), but it is interesting that the Metro Area's share of total business establishments in Minnesota remained nearly the same in both years (about 54 per cent).

Future Studies

Over the course of the more than 30 years since the trade center concept was first developed, there have been significant changes in local, regional, and national economies and in the global marketplace; in the availability of data; and, most recently, the reorganization of the Standard Industrial Classification system into the North American Industry Classification System. These changes suggest that future studies should explore how the

eight-level hierarchy might be improved using the new industrial classifications and whether additional information (such as sales tax data) might enrich the analysis.