

Clusters in Rural Areas: Auto Supply Chains in Tennessee and Houseboat Manufacturers in Kentucky

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Introduction

Clustering is a natural phenomenon for value-added businesses. The tendency of businesses to locate near their customers, suppliers, specialized services, and competitors—to *cluster*—occurs in all places and all industries. Researchers use a variety of terms to designate a critical mass of such geographically-bounded related businesses, e.g., agglomerations, industrial districts, technology regions, as well as the term we have chosen, *cluster*.

The term *cluster*, which we use as our unit of economic analysis, is defined as “a geographically bounded concentration of similar, related, or complementary businesses with active channels for business transactions, communications, and dialogue, that share specialized infrastructure, labor markets, and services, and that are faced with common opportunities and threats” (Rosenfeld, 1995). The reason firms tend to cluster is to take advantage of the opportunities to achieve external economies (the unintentional outcomes derived by all within the cluster) and collective efficiencies (the intentional and joint actions open only to those who choose to participate). These advantages outweigh the potential disadvantages, such as leaking company information and losing employees to competitors (Schmitz, 1997). The proximity and access to specialized labor markets, services, suppliers, and opportunities for collective innovation expand the competitive advantage of all members.

To ascribe the term *cluster* to a particular set of industries, one needs some criteria for industry inclusion, geographic boundaries, and critical mass. Both the integrating characteristics of the cluster (e.g., product, technology, or skills) and the reasons for classifying influence the boundary conditions selected. When defined for public policy purposes, such as targeting public services, resources, or reverse investment, clusters tend to cover large geographic areas that match political boundaries and include large proportions of the economy. This is often necessary to obtain the required political support. Government databases containing numbers of employees and establishments by

county are the most common descriptors, and often clusters are defined by broad industry sectors that stretch across relatively long distances. These generic clusters have little in common with more narrowly defined and more densely packed “industrial districts” that fomented the policy interest in clusters, and firms that meet the inclusion criteria often find they have little common ground on which to build and develop associative behaviors. In the United States, states select clusters such as “professional services,” “manufactured inputs,” “health care,” “knowledge creation services,” or “high technology,” all of which are akin to a traditional sector approach, where the only spatial dimensions that influence policy are political boundaries and information is used mainly for targeted recruitment.

Where states do pay more attention to specific location, the reliance on data-driven identification of clusters results in another natural tendency—to find clusters primarily in large urban areas where scale alone makes the cluster highly visible. Most people readily associate Detroit with automobiles; Chicago with food processing; Los Angeles with cinematics; Pittsburgh with steel; San Jose with computers; Rochester, New York with optics/imaging; Rochester, Minnesota with health care; New York with finance and publishing; and Nashville with music and, more recently, automobiles. Some cities have begun marketing themselves as having dominant clusters in order to build an image of expertise and concentration as, for example, environmental technologies, biotechnology, semiconductors, aerospace, or software. Further, some small to mid-sized cities have developed industry reputations as a result of agglomerations, often in lower wage industries: Dalton, Georgia with carpets; Tupelo, Mississippi, Hickory, North Carolina and Marquette, Michigan with furniture; and Peoria, Illinois with farm equipment.

Using numbers of establishments or employees and input/output market relationships as the primary criteria for identifying clusters results in a bias toward more populated areas and product-oriented clusters and misses many important cross-sector

commonalities that produce learning, innovation, and externalities (Doeringer and Terkla, 1995). Such a protocol also may overlook micro-clusters that may be locally significant but nationally inconsequential. However, a recent study found that the initial size of a cluster does matter to future growth, and that larger concentrations significantly boost industry income growth (Henry, Barkley, and Zhang, 1997). This is a logical outcome, since a critical mass of companies is necessary to attract the specialized services and key suppliers that contribute to a cluster's economic advantage. Five mid-sized electronics companies may dominate the economy of a small city yet be too small to develop enough of the factors associated with large scale vibrant clusters that typically attract attention.

The critical issue for rural development in the Tennessee Valley, as articulated by Barkley and Henry (1997), is whether targeting clusters, even if appropriate criteria are used, is a useful strategy for many rural communities. Are cluster strategies useful only under the somewhat exceptional circumstances where well-defined clusters have formed or begun to form, or can interventions create clusters from whole cloth? Are there combinations of enough companies with common interests or competitive factors in rural areas to be termed clusters?

This research only addresses the instances where clusters do appear to be present. It examines three important issues related to the characteristics and power of rural clusters.

- Are there benefits that spill over from metropolitan clusters to surrounding, less urban areas?
- Do small clusters in towns and small cities act like larger clusters in more densely populated places?
- Are local and state economic development agencies aware of the clustering occurring, and does it affect their practices?

The first section of this study addresses the question of to what degree are the benefits and consequences (i.e., jobs and wealth) of clusters concentrated geographically around their population hubs or, conversely, to what extent do their benefits spill over into larger, less populated surrounding areas. The boundaries of

clusters are somewhat arbitrary, and in many clusters the numbers of companies simply diminish with distance from the center. Further, clusters have no relationship to political boundaries and thus may be missed in single state analyses. For example, the machine tool cluster in Greenville-Spartanburg includes firms in North Carolina's nearby Mecklenburg County, and the metalworking cluster in central Massachusetts spreads south into Connecticut and north into Vermont and New Hampshire. In this study, the auto industry around Nashville, Tennessee is a central cluster hub that we examine for spillover benefits into rural areas, but the much larger cluster known as "Auto Alley" extends along I-65 from southern Michigan to northern Alabama.

The second section examines a place where some local expertise has developed, spread, and spawned new suppliers or imitators that have resulted in a local cluster but which may not stand the "numbers" test of many cluster-identifying templates. Micro-clusters are quite common in Europe where in Italy, for instance, Premana is known for scissors, Gardere Val Trompia for firearms, Cremona for violins, and Vigevano for fashion footwear. There are also instances in the United States of small micro-clusters with a handful of similar or related firms developing in a rural areas, such as helmet manufacturers in Monticello, Idaho, metalworkers around Elbow Lake, Minnesota, steel farm gates and fence panels in Liberty, Kentucky, or potters in Siler City, North Carolina. Many of these clusters attract attention only by chance, when an academic or policy maker notices a local specialization and records the story. Do small towns with micro-clusters, which may be locally dominant but too small to be noticed or attract specialized resources, still derive the benefits associated with larger clusters, or do they exhibit different characteristics? It is possible that while external economies are diminished by diseconomies of scale, collective efficiencies are enhanced by the *gemeinschaft* of smaller places that supports trust and learning. This study uses the houseboat industry in the area around Somerset, Kentucky to examine the inner workings of a small rural cluster in the TVA region.

Reviewing the Literature on Clusters in Rural Areas

Two strands of inquiry characterize research on rural clusters, one intentional and one unintentional. The unintentional studies examine clusters in general, of which some happen to be located in small cities or less populated areas. Meanwhile, the intentional studies specifically look for and select clusters in rural locations in order to examine and explain urban-rural differences or special conditions associated with rural locations. Some of the most interesting unintentional research comes from Europe and less developed nations, where there is less emphasis on distinguishing between urban and rural places based only on population than in finding policies to strengthen economies of smaller and more remote places. For example, the numerous studies of the footwear cluster in Brazil's Sinos Valley include impacts in rural areas, though not explicitly analyzed as a rural development policy.

To provide a foundation for the analyses, researchers have developed various taxonomies for describing clusters. These are based, for example, on organizational structure, forms of relationships, or on some principal purpose. The most widely cited model is Michael Porter's "diamond" (1990), whose four points are factor conditions; demand conditions; strategy, structure, and rivalry; and related and supporting industry.

Other observers developed competing models, often defined by characteristics they believe most important, such as the innovative milieu (Maillat, 1995); learning region (Morgan, 1996; Lorentzen, 1998); local production system (Pezzini, 1996); social capital (Putnam, 1993); regions of flexible specialization (Asheim, 1997); or targeting allocations of public resources (Waits, 1996; Held, 1996). This, of course, colors their selections of policy interventions and the potential for clusters in less populated regions. The taxonomies also help determine the breadth and geographic scale by which clusters are defined, with those interested in local production systems and public policy relying on numbers and growth, and those interested in innovation and learning focusing on a range of social interactions, organization memberships, and institutional relationships.

Current interests in clusters and sector-targeted economic development strategies in the United States originated from the European

experience, particularly in northern Italy, the prototypical small town clustered economy. Outside of the United States, population is viewed more as a continuum rather than a bimodal distribution, and scale differences are assigned less importance in policy considerations than the composition of the economy. Outside of the United States, the term *rural* is more often synonymous with an agricultural economic base, not a descriptor of scale.

The lack of attention to population density in Europe and elsewhere may be due to the fact that its concept of industrial districts has been confined to smaller geographic areas than the currently popular vision of clusters in the United States. Many of these districts happen to be in small cities and towns. In Italy, many clusters started as economies dependent on agriculture or the production of raw materials, and as those industries automated, the regions shifted into related higher value-added industry. For instance, a raw silk industry around Como, Italy became a high fashion apparel cluster, and a fishing industry in Nelson, New Zealand began processing its catch and became a processed foods cluster.

Some clusters began as large companies that originally located in less populated areas to take advantage of low wages and surplus labor markets that later disintegrated into smaller firms. This scenario describes the origin of the ceramics industry in Sassuolo, Italy (Russo, 1998) and furniture manufacture in Tupelo, Mississippi (Rosenfeld, 1995). Others developed by investing the surplus from an agricultural economy into another industry, such as the hosiery industry in Castel Gofreddo, Italy (Brusco, 1988; Pezzini, 1994). Still others were created by transforming a common local craft into a related value-added cluster, such as straw hats to fashion knitwear in Carpi, Italy or plastic combs to more advanced plastic parts in Leominster, Massachusetts (Murray, 1999).

The concept of industrial districts implies a high degree of concentration, in part because a *milieu* that fostered networking and technology transfer among companies was considered an essential ingredient. Therefore, a dense social infrastructure with a high frequency of interaction sparked the cluster's growth. But in countries that do not exhibit as high degrees of local specialization, the conceptual framework has shifted from districts to regions where industries are clustered, but not so tightly and

geographically, and where scale economies are more important than joint actions. Large parts of these new, less specialized clusters are not heavily populated. Thus, clusters of companies not necessarily alike, but with key elements in common, are recognized in the peripheral regions of Denmark's West Jutland, small cities of New Zealand, and rural cantons of Switzerland.

Some analysts have designed "intentional" research studies to evaluate the effects of the clustering of industry sectors in nonmetropolitan areas. Gibbs and Bernat (1997), for example, found that incomes of those employed in industries clustered in nonmetro counties, as defined by two-digit SIC codes, are higher on average than those of workers in industries that are not clustered.

A small symposium of experts and practitioners met in North Carolina in 1995 to examine some of the rural implications of clusters. The group concluded that in less populated areas, clusters generally develop along one of four paths (Rosenfeld, 1995).

- A small concentration of companies that is just large enough to establish a collective identity and operate in some ways as a system (helmet manufacturers in Montpelier, Idaho)
- Satellite clusters, or groups of firms that identify with a larger cluster some distance away but still close enough to gain some of the external economies (hosiery in Randolph County, North Carolina)
- Firms that are dispersed by urban standards but whose members are willing to travel some distance to gain the benefits of association (metalworkers in western Minnesota)
- Less well-defined clusters of firms that are not alike in all ways but have enough in common to benefit from others (precision manufacturers in northeast Oklahoma)

The structure of the industry in part dictates the path to rural areas. Non-durable goods manufacturers that have used low-skill mass production methods tend to favor rural areas, and as more people acquired the skills, the entrepreneurs among them became independent

competitors or suppliers. Many of the furniture and apparel clusters in the United States sprouted from large rural employers. Clusters that require highly skilled workers and professionals, who often are quite mobile, tend to develop in rural areas with natural attractions or cultural amenities, such as near university or college towns. Firms that might be in different sectors, but are dependent on a common locally available resource (such as lumber), might find enough needs in common to begin acting collectively as a cluster.

The symposium's participants collectively developed a profile of characteristics that, if measured, would provide a good picture of a cluster's power and potential. These include:

Workforce skills: Do the skills of the labor force fit the needs of the industry? Do these include not only technical skills and competencies, but general knowledge of the industry and entrepreneurial skills?

Human resource development: Are there opportunities for specialized education and training for the cluster's major occupations, and does the industry itself invest in training?

Proximity of suppliers: Are primary and secondary suppliers and sources of raw materials located nearby?

Capital availability: How well do area banks understand the industry, and do they meet the cluster's needs for working and start-up capital and access to seed and venture capital?

Access to specialized services: Are there specialized public and private sector services, such as technology extension, export assistance, small business centers, designers, engineering consultants, accountants, and lawyers?

Machine and tool builders: Are companies that design and build machines and tools used by the industry nearby, and are there working relationships that foster innovation?

Intensity of networking: Do firms in the industry cooperate? How often and to what degree? Do they share information or resources? Do they participate in joint production, marketing or problem solving? How often and to what degree?

Intensity of competition: Are there multiple firms with overlapping capabilities and competencies and does competition push firms to seek new products or markets?

Social infrastructure: How strong and active are local businesses and civic associations or

chapters of associations, and are there other informal business networks?

Entrepreneurial energy: What is the rate for new business start-ups from within the local industry and attraction of new firms or suppliers from outside the region?

Innovation: How quickly are new and enhanced technologies conceived, developed, and adopted?

Shared vision and leadership: Do firms have a collective identity, plan for and share goals, have a vision for the future?

This taxonomy is difficult to apply to widely geographically dispersed clusters—such as the auto cluster around Nashville. Collecting sufficient qualitative data to thoroughly explore each of the dimensions was beyond the resources and scope of this project. As such, the taxonomy is directly used in the houseboat cluster analysis and serves as the general framework for the auto cluster section.

Rural Clusters in Kentucky and Tennessee

This report addresses two questions that grow out of both analyses of and interest in clusters as a rural development strategy:

- First, to what extent do the economic benefits of an urban cluster spill over into surrounding, less urbanized areas? Henry, Barkley, and Zhang (1997) hypothesized that there would be an urban spillover effect through regional labor and land markets, but added that an urban backwash could occur in nearby rural areas, with urban growth dampening rural growth.
- Second, how does a nascent rural cluster develop and expand? How does it operate and compare to larger, mature clusters, and how do member firms view advantages and/or disadvantages? Does the local competition spur or inhibit innovation?

As states, neither Kentucky nor Tennessee officially embraces clusters as a development strategy, although Tennessee has conducted various statewide sector studies. Each state invests much of its economic development resources in inward investment (recruitment) for

job growth. Yet, there is growing interest in clusters, and both states are giving serious consideration to contracting for cluster analyses. Further, without explicitly targeting clusters, states try to take advantage of linkage approaches to recruitment because they realize—backed by research—that proximity to a customer or group of suppliers improves their chances of success (Anderson and Johnston, 1992).

Given the regional diversity within each of the two states, it is difficult to envision an analysis that did not take spatial considerations into account. And, given the sizable number of large assembly plants in the two states, it is equally unlikely that any analysis would not include the automobile supplier industry. Yet there are undoubtedly many smaller hidden clusters that would not be revealed in macro-analyses. The houseboat manufacturing cluster, for example, was recognized by a Kentucky journalist who had been to Europe, been exposed to networks and industrial districts, and realized the similarities between the Kentucky area and European districts (Bishop, 1997).

Patterns of business clustering are becoming increasingly important and popular tools of state and regional policy, both as models for understanding economies and more effectively formulating policy and delivering services. External economies and collective efficiencies, if effectively supported and exploited, can support competitive niche industries in regions. To build such advantages, states, regions, counties, and cities are introducing “cluster development” strategies that seek to tighten interdependencies and fill gaps in local production systems.

Methodologies

Since the hypotheses and questions associated with the two clusters are quite different, the methodologies differ. The houseboat manufacturers’ cluster is too small for surveys or significant data analysis; it is geographically concentrated and would be easy to miss as a cluster using the common “numbers crunching” techniques. The main reason for selecting this cluster is to see if a smaller set of companies uses clustering to further its interests and whether public means might further develop such a small cluster located in a poor and relatively isolated (from major transportation and population hubs) region. The approach we

use is a case study that relies heavily on interviews with key actors in the region and information about the industry sector to draw conclusions.

The auto supplier chain analysis is a study of an acknowledged and heavily recruited cluster, with the purpose being to learn about the diffusion of economic benefits into nonmetro counties. The target area is the Nashville Metropolitan Statistical Area (MSA). The MSA is home to two original equipment manufacturers (OEMs), Nissan and Peterbilt, and one county removed from General Motors' Saturn facility. Nashville, however, is part of a larger automobile cluster sometimes referred to as "Auto Alley," running from southern Michigan to northern Alabama. Suppliers in this multi-state region are in sufficient proximity to many final production facilities to meet just-in-time delivery requirements and to confer on design issues.

An analysis of auto suppliers, based on data supplied by the state, shows that auto parts manufacturers are more than twice as concentrated in Tennessee's nonmetro counties (8.4 percent of total employment) as in the state's metro counties (3 percent). The concentration of suppliers in the ring of nonmetro counties surrounding the Nashville MSA was nearly 50 percent higher than the concentration inside the MSA, suggesting a proclivity of suppliers to locate in rural areas, which often equates with lower costs. The purpose of this part of the study is to learn not just where the jobs and wealth related to the cluster reside but to learn to which areas the benefits accrue and why. Are counties with significant numbers of auto suppliers the result of successful local strategy or simply the beneficiaries of cost-justified business decisions?

I. Nashville Region's Automotive Cluster

For the purposes of this study, the Greater Nashville region is identified as the 26 counties (including four counties in south central Kentucky) that include or border the Nashville Metropolitan Statistical Area (MSA).¹ Of this number, 17 are nonmetropolitan counties that encircle the Metropolitan Area counties; they are referred to in this report as the *outer ring* (see Figure 1).²

The cluster studied is broadly defined by the Motor Vehicle and Equipment (MVE) industry. This category includes five different four-digit Standard Industrial Code (SIC) sectors: *Motor vehicles and car bodies* (SIC 3711); *Truck and bus bodies* (3713); *Motor vehicle parts and accessories* (3714); *Truck trailers* (3715); and *Motor homes* (3716). It also includes associated second- and third-tier supplier firms in other sectors, such as automotive stamping, iron and steel castings, and other fabricated metals, as well as automotive trimmings and textiles, fabricated plastics, paints and varnishes, and tires.

This data analysis is followed by descriptions of four outer ring counties targeted for site visits and more in-depth analysis of the counties' economic development activities in general and their support of motor vehicle suppliers in particular. The next section, drawing from the literature, examines factors affecting the growth of the MVE industry in Greater Nashville. It provides a framework for examining the degree to which the growth of the industry has spilled over into outer ring counties. The following points are addressed:

- Importance of the MVE industry to outer ring counties' economies
- Level of attention the cluster receives within economic development, workforce development, and planning policy circles
- Factors affecting the growth potential of MVE-related activity in outer ring counties, and the implications this has for expanded economic opportunity

Data for the analysis come from:

- Interviews with motor vehicle part suppliers, industry associations, economic development agencies, employment and training providers, and county officials
- Documentation of economic development and workforce programs and policies that have impacted or have the potential to impact the MVE industry
- Survey results from economic development officials in outer ring counties

Figure 1: Greater Nashville Region



While the project team collected data and surveyed some entities in all 17 outer ring counties, it chose four specific counties, each representing one of the following sets of conditions, to represent a cross section of the outer ring for more in-depth qualitative interviews and information collection.

- Weak economy and high auto supplier concentration
- Weak economy and low auto supplier concentration
- Strong economy and high supplier concentration
- Strong economy and low supplier concentration

The strength of the economy in the counties is represented by an index based on averaging the rankings of per capita income, change in population over ten years, poverty rate, and change in per capita income over ten years. The supplier concentration is based on ranking both number of auto-related firms and number of employees in these firms.

After collecting information about all outer ring counties, including those across the Kentucky border, the counties were divided into the four cells described above. The counties selected to represent each category are shown in Table 1.

Table 1: Target Counties

Coffee— <i>weak economy, high suppliers</i>	Logan— <i>strong economy, low suppliers</i>
Macon— <i>weak economy, low suppliers</i>	Marshall— <i>strong economy, high suppliers</i>

The appendix provides more information about the county selections. The intent behind these choices was to compare different economic conditions and different levels of auto suppliers and find possible explanations or relationship between them. For example, are there specific policies that the “high supplier” counties have undertaken to attract those companies? Or, are there certain barriers present in a “weak economy” county that perhaps Coffee County, with its high number of suppliers, has overcome?

After interviewing economic development and other officials in the counties after their selection, we realized that some conditions had changed since the published (mostly 1996) data upon which the analysis was based. Specifically, anecdotal evidence indicated that Logan County’s economy was no longer as robust as it had been relative to other counties and that Coffee County’s economy is now stronger relative to other nearby counties than published data indicate. Nonetheless, the four counties still are representative of the outer ring as a whole, and the insights gained from them will be discussed later.

In addition to interviews conducted in the four counties, we conducted a fax survey of economic development officials, representatives of chambers of commerce and some elected officials in all 17 outer ring counties. The purpose of the survey was to understand the extent to which the MVE industry in the Greater Nashville region has contributed to each county’s local economy and what steps they have taken to facilitate this contribution.

Auto Industry Overview

The Tennessee Valley Authority’s service region contains one of North America’s most extensive concentrations of automobile and auto-related manufacturing. This concentration stems not only from the presence of four final-stage manufacturers, but also from other vehicle assembly plants proximate to the TVA region

and scores of parts producers located throughout. The MVE cluster has contributed considerably to the economic growth in the TVA region over the past two decades. With an annual motor vehicle production level of over 600,000 cars and trucks, the state of Tennessee ranks fifth in the nation in terms of production output, after Michigan, Ohio, Missouri, and Kentucky. Nissan, Saturn and Peterbilt, the state’s three assembly plants (original equipment manufacturers or “OEMs”) are part of a broad multi-state network of 12 major assembly plants in surrounding states. This has spawned a ready market for Tennessee’s motor vehicle parts suppliers that total over 800 firms and include such high profile plants as Bridgestone/Firestone and TRW. Together, the three OEMs and the 800 + in-state suppliers employ approximately 128,000 people. This cluster employs one-fifth of the state’s total manufacturing workforce. However, the geographic dispersion of the motor vehicle cluster’s impacts on economies is not well understood.

As mentioned earlier, the development of Tennessee’s MVE industry benefits from national industry trends characterized by the shift of the industry away from the coasts and northern urban centers, and the disaggregation of suppliers employing labor-intensive production practices to areas of inexpensive labor in the South. Although this geographic shift has not eliminated the intensive MVE industry presence in the Midwest and Northeast, it has shifted the axis of concentration from an east-west orientation to a north-south corridor that stretches from Michigan to Alabama. This corridor includes parts of Indiana, Ohio, Kentucky, Alabama, and Tennessee. Many of the MVE firms are highly concentrated along or in proximity to interstate highways and other transportation networks.

In examining the location decisions of first-tier MVE suppliers nationally, Thomas Klier

found that many of the suppliers in the east-west corridor from New York to Chicago are operating older plants and tend to be U.S. owned. Newer plants are more likely to be in the north-south "Auto Alley." He also observed that foreign-owned plants (which tend to also be newer facilities) typically locate in the southern portions of "Auto Alley" and have very tight supplier networks, which likewise helps account for the concentration of foreign-owned suppliers near foreign-owned auto assembly plants (Klier, 1998).

OEM Presence in Middle Tennessee

Much of the growth of Tennessee's MVE industry occurred over the last 15 years, though a number of prominent firms have been in the region for several decades. Four final-stage vehicle manufacturers are located in the TVA region (See Table 2). The Nissan, Saturn and Peterbilt facilities are located in the study area of Greater Nashville, with each having begun production in a different decade. Each of the three plants is located in areas that were, at the times they each broke ground, on the perimeter of Greater Nashville's central urbanized area.

Nissan Motor Manufacturing opened its plant in Smyrna in 1983. Located in the northern portion of metro Rutherford County, it is close to the metro core of Davidson County. Davidson County itself is host to Peterbilt Motors, which has been in operation at that location for 30 years. Saturn, a division of General Motors, is located in Spring Hill.

Although Maury County, Saturn's home, is designated as nonmetropolitan, the plant itself is very close to Williamson County, the region's fastest-growing metro county. The Saturn plant is the most recently developed facility (c. 1990) and represented a significant departure from GM's practice of siting plants in the Upper Midwest. Like Peterbilt, Saturn is a union shop, but it has an unusual partnership arrangement between labor and management. Many of Saturn's workers were recruited outside of Tennessee, and quite a large number of them were laid-off union workers from Midwest operations. The fourth plant in the TVA region is in Bowling Green, Kentucky, where GM operates its Corvette production facility. The plant is located one county outside of this study's outer ring; however, it draws some employees from the Greater Nashville counties. It has been in operation for over 20 years.

Collectively, these four final assembly plants employ approximately 16,400 workers. Each plant draws workers from metro and nonmetro counties in the Middle Tennessee region, in varying degrees based on the plant's proximity to Nashville. Saturn, situated in nonmetro Maury County, draws 38 percent of its workforce from that county and 14 percent more from other nonmetro counties. Nissan draws 16 percent from the outer ring counties, although a significant number of Nissan's workers are reported to live in rural areas outside of the Middle Tennessee region.

Table 2: Motor Vehicle Plants in the TVA Region

Company	Opened	Approx. Employees	County	Co. Demographics	
				PCPI ^A	%Rura ^B
Nissan Motor Mfg. Corp.	1983	6,000	Rutherford Co., TN	\$21,260	44%
General Motors (Saturn)	1990	8,000	Maury Co., TN	\$19,371	41%
General Motors (Corvette)	1981	1,000	Warren Co., KY	\$20,070	42%
Peterbilt Motors Co.	1969	1,400	Davidson Co., TN	\$27,812	1%

^A1995 Per Capita Personal Income from U.S. County Data Book; ^B1990 U.S. Census

More information about the location of the region's vehicle assembly plants follows.

Peterbilt. Peterbilt Motors Company was the first vehicle manufacturer to locate in Middle Tennessee when it opened its first East Coast production facility in Madison, Davidson County, in 1969. At that time, the metro area's

population was only 700,000 and Madison, located 15 miles from Downtown Nashville, was on the region's urban fringe.

Nissan. Nissan Corporation pioneered the trend of foreign automakers investing in the United States, deciding in 1980 to locate a factory in Smyrna in a highly publicized

competition among various state governors. After Honda's Ohio plant and Volkswagen's short-lived factory in western Pennsylvania, the Nissan facility in Tennessee became America's third foreign-owned auto production plant. The state's right-to-work status, which prohibits a closed shop and thus makes union organizing difficult, appealed to Nissan, as did its proximity to key markets. Smyrna, 30 miles from Nashville, was at that time on the urban fringe of Greater Nashville. The plant's 3,400 original employees largely came from the region's existing labor pool, and the location in a basically rural part of the MSA meant that Nissan did not encounter complex planning and zoning regulations. Today, 16 percent of the plant's employees commute from surrounding nonmetro outer ring counties. While the siting of this facility took place several years before the era of massive state subsidies for such projects, Nissan nonetheless received an estimated \$33 million in state assistance in the form of workforce training and transportation improvements.

Saturn. General Motors' creation of its Saturn division in the 1980s spawned one of the largest competitions for an industrial facility in American history. The proposed plant, which forecasted 6,000 jobs plus another 15,000 in nearby suppliers, was actively recruited by 38 states. Together, these states put forth more than 1,000 potential sites. The selection of Tennessee for this facility was seen as a coup for

the state's economic developers and considered a harbinger of future plant locations both for Tennessee and the Midsouth in general. General Motors earmarked Saturn to break many corporate traditions, both by its semi-autonomous and collaborative management structure, and by its geography. A location away from the Midwest would reinforce this notion of independence. The selection criteria included standard measures for industrial location: freight accessibility, state and local taxes, labor costs, and utility costs. Spring Hill's convenience to road and rail transportation, the region's perceived high quality of life, low cost of living, substantial state financial incentives, and heavy wooing by government officials combined to close the deal with General Motors in 1985.

Although employing thousands of workers, Saturn is unique among the Tennessee plants in that most employees moved there from other parts of the country, rather than having been hired from Tennessee's existing labor force. Saturn's affiliation with the United Auto Workers (UAW) led to the hiring of many downsized autoworkers from the Midwest, who in turn constituted the majority of the "Saturn Migrants" to the Spring Hill area. This migration was unanticipated in the early negotiations.

In addition to the four OEMs in the study area, the Middle Tennessee region is within 300 miles of twelve other final-stage vehicle manufacturers (See Table 3).

Table 3: Other OEMs within 300-Mile Radius

COMPANY	LOCATION	COMPANY	LOCATION
BMW	Spartanburg Co., SC	Mack	Fairfield Co., SC
Ford	Fulton Co., GA	Mercedes-Benz	Tuscaloosa Co., AL
Ford	Jefferson Co., KY (2 plants)	Toyota	Scott Co., KY
Freightliner	Gaston Co., NC	Toyota	Gibson Co., IN
Freightliner	Rowan Co., NC	Volvo Trucks	Pulaski Co., VA
General Motors	DeKalb Co., GA		

Counties proximate to assembly plants experience three primary effects. First and foremost, the counties can attract suppliers to the OEMs and, in turn, suppliers' suppliers (i.e., second-tier or third-tier suppliers).³ The development and expansion of a regional automotive industry supply chain in Greater Nashville, prompted by the large concentration

of final assembly plants locating in and around the Tennessee Valley, is a source of current and potential investment and employment for nearby counties that are able to compete.

Second, the companies located inside the Nashville MSA employ people who live in and commute from surrounding outer ring counties and contribute to the local economies (See Table

4). Saturn employs about 4,200 people living in the outer ring counties. Although about three-quarters live in Saturn's home Maury County, the rest commute from neighboring counties. About 1,000 outer ring residents also commute to Nissan's plant inside the Nashville Metro Area. In addition to the direct employment, although numbers were unavailable, a number of people residing in nonmetro counties also commute to work with the various agencies that subcontract for services at the plants, such as security and food services.

The third effect, which is virtually impossible to measure directly and therefore applied as an estimated multiplier, is the investments, expenditures (and charitable donations) made by auto companies and employees in the nonmetro economies, including housing, taxes, food and beverages, and entertainment.

Attracting Suppliers

As important as direct employment impacts to regional economies in this cluster are, the economic gains resulting from regional purchasing and supplier relationships are even

greater. Tennessee, in particular, has benefited considerably from the migration of the auto industry and its supply chain South from the Midwest. The 123,000 people employed by suppliers alone now comprise 4.9 percent of the state's total labor force. Figure 2 shows employment in the motor vehicle supply chain in each of Tennessee's MSAs and for the balance of nonmetro counties. Employment by suppliers accounted last year for 8.4 percent of the outer ring labor force (66,780) and 3.4 percent of the metro labor force (56,417). Among major MSAs, the Tri-Cities region has the highest concentration and largest number employed and Nashville is second.

Nissan and Saturn both purchase extensively from in-state suppliers. Of Saturn's 31 direct suppliers located in Tennessee, 17 are in Greater Nashville. Nissan has an even stronger statewide ancillary supply chain in the state. Included among its 51 in-state suppliers are Nissan's own engine plant in Franklin County, its Calsonic parts subsidiary in Bedford County, and Kantus Corporation, another Nissan subsidiary in Marshall County.

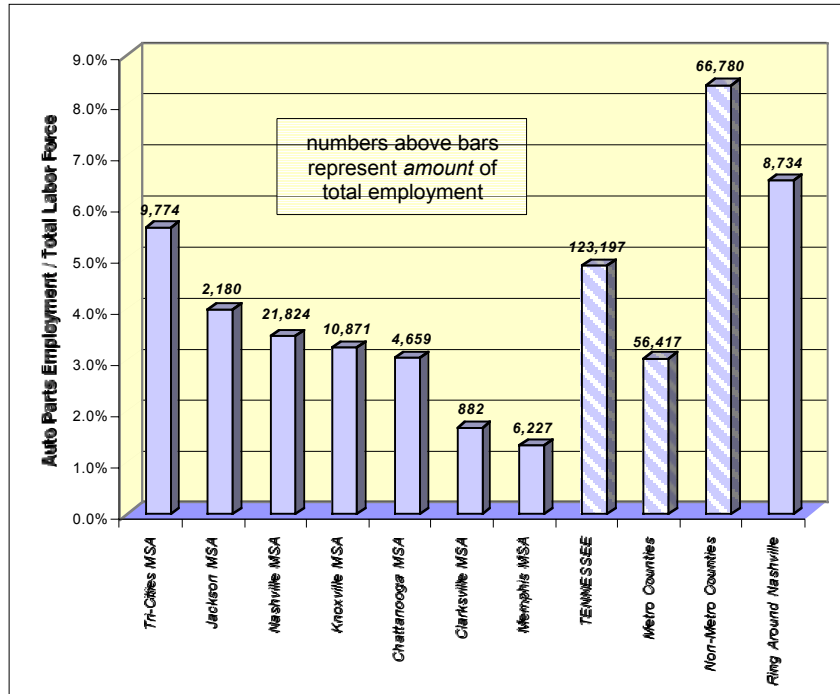
Table 4: Auto Suppliers, Employment in Suppliers, and Commuters, by Outer Ring County

County	Motor Vehicle Parts Suppliers*		Saturn and Nissan Plant Commuters	
	Firms	Employees	Saturn	Nissan
Allen, KY	2	605	0	0
Bedford	6	1,497	112	180
Cannon	2	41	0	93
Coffee	14	1,320	0	225
DeKalb	7	1,865	0	78
Hickman	1	11	82	13
Houston	2	132	0	4
Humphreys	1	30	0	10
Logan, KY†	3*	555	0	0
Macon	2	141	0	20
Marshall	10	2,078	925	164
Maury	10	664	3,104	160
Smith	7	995	0	39
Trousdale	0	0	0	19
Simpson, KY	4	1,500	0	0
Stewart	2	140	0	1
Todd, KY	0	0	0	0
TOTAL	71	11,434	4,223	1,005

Sources: Tennessee *Automotive Suppliers Directory*; Kentucky Department of Economic Development; Saturn Corp.; Nissan Motor Mfg. Peterbilt Motors declined to provide commuting information. **Motor Vehicle Parts Suppliers* does not include OEM plants.

† Logan County Chamber of Commerce identified an additional seven second- and third-tier suppliers not included in Kentucky's database.

Figure 2: Penetration of MVE employment by MSA



According to databases administered by the states of Tennessee and Kentucky, the Greater Nashville region is home to 250 direct motor vehicle suppliers, with another nine suppliers located in adjacent Kentucky counties. Collectively, these suppliers employ approximately 30,000 workers. Suppliers are more highly concentrated in outer ring counties

(See Table 5), although the Nashville metro plants are larger and, therefore, employment is somewhat more concentrated in the metro area. The location quotients (ratio of concentration in the area studies to concentration in the United States) show concentrations two to four times the national average in both metro and outer ring areas.

Table 5: Location Quotients, Nashville MSA and Outer Ring

	Nashville MSA	Outer Ring Counties	Regional Total
LQ by establishments	2.11	4.01	2.49
LQ by employment	3.65	2.98	3.53

Although the companies produce a wide variety of parts, certain industries are better represented than others. The largest is the first-tier *Motor Vehicle Parts and Accessories* sector (SIC 3714). Throughout Greater Nashville, more than 11,000 workers are employed in 53 firms in this sector. Other sectors also are well represented in the region, mainly due to the presence of one or two large manufacturing facilities. For example, auto glass manufacturing is well represented in the region, but principally because of the large Ford glass plant in Nashville. The concentration of tire production is also due to the presence of a few large plants, including a Bridgestone/Firestone tire plant that employs more than 2,300 people.

Aside from these concentrations, however, most of the firms engaged in auto-related manufacturing are spread over various industries. This presents a picture of a diversified manufacturing capacity rather than a region that is heavily dependent on just one component, such as fabric or plastics. Increasingly, Tennessee's automobile parts production resembles that of the Midwest in terms of manufacturing diversity. This increased diversity is a considerable incentive for other parts producers, as well as vehicle manufacturers, to locate in or near Middle Tennessee.

Approximately 95 percent of the 250 Greater Nashville auto parts suppliers identified by the Tennessee Department of Economic and Community Development are branch plants, and only 12 plants are identified as independent facilities. However, many of the facilities identified as branch plants are operated by local companies and are effectively locally-owned and operated employers. Further, nearly half of the

branch plants are owned by parent companies from within Tennessee itself. The region's non-locally owned branch plants are owned by parent companies from throughout the nation and abroad. The majority of the non-local owners (51 percent) are from traditional auto-producing areas of the Midwest. Approximately 20 percent of Greater Nashville's auto parts suppliers are foreign owned.

Not surprisingly, the non-local branch plants are generally newer to the region than are the companies that are owned locally, indicating that the region is growing in attractiveness to national and, increasingly, international manufacturers. In 1980, Tennessee had only nine Japanese-owned companies; in 1989 it had 49. The average year of establishment for Tennessee-owned firms is 1971, but for out-of-state firms it is 1979. Of the region's 87 auto suppliers that have established plants in the region since 1985, 29 are Tennessee-owned, and 58 are owned by out-of-state or foreign firms. Overall, more than one-third of the region's automobile parts workers are employed in plants that began operations within the last 15 years. Table 6 illustrates this breakdown and shows that an even higher proportion of cluster-related employees in nonmetropolitan counties are in recently located auto supplier firms.

There additionally is a noticeable difference in employment size for in-state and out-of-state firms. The 114 firms reporting employment data that were identified as Tennessee owned companies have an average size of 63 employees, while the 125 employers owned by out-of-state or foreign firms average 186 employees per company.

Table 6: Percentage of Employment of Auto Parts Suppliers by Date of Establishment

	Firms Established Before 1985	Firms Established 1985 or later	Undetermined Establishment Date
Nashville MSA	58%	34%	8%
Outer Ring	48%	47%	5%
Total	55%	38%	7%

Source: Tennessee Department of Economic and Community Development

Figure 3: Existing Firms by Date of Establishment

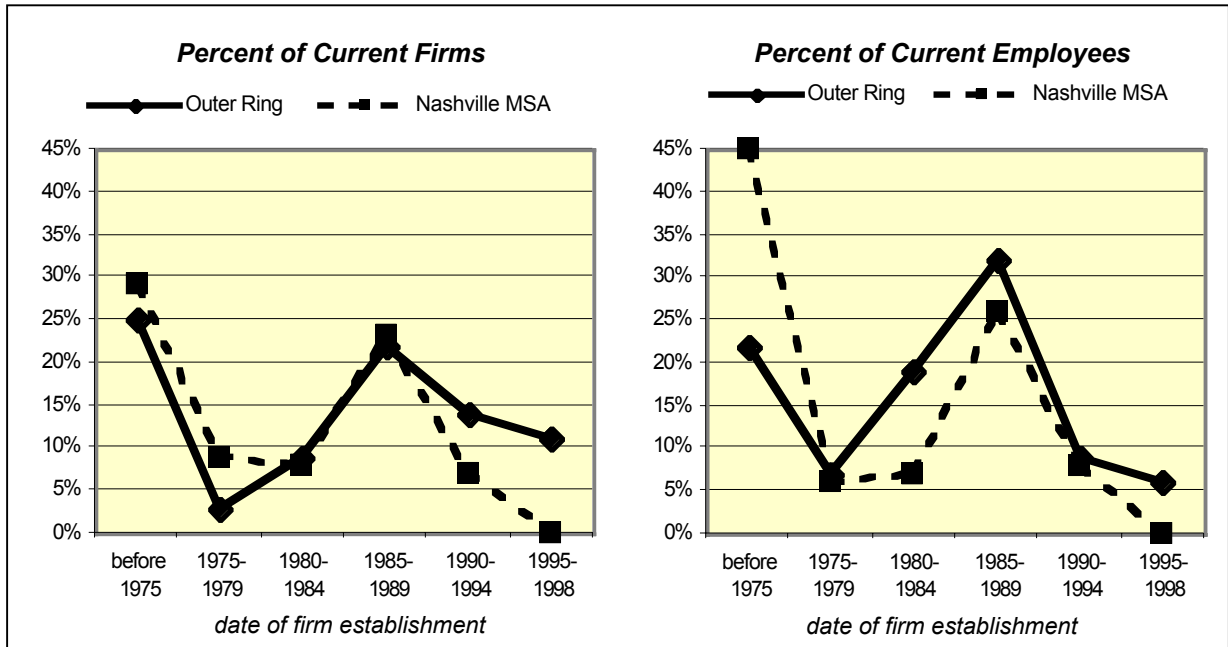


Figure 3 shows the percentage of existing firms (along with the corresponding percentage of their respective employment) that originally established in Greater Nashville during six periods. The figure illustrates that outer ring counties have slightly outpaced Nashville MSA counties both in terms of numbers of firms established since 1985 and the number of employees in these new auto suppliers. The data indicate that outer ring counties are, in fact, somewhat more attractive to suppliers than their MSA neighbors.

While much of the auto parts industry's growth in Tennessee is attributable to recently established large plants owned by out-of-state or foreign companies, local firms still play an active role in the sector. This is particularly true in certain sectors, such as machining or metalworking, which together account for nearly half of the locally owned auto supply firms that have emerged in the region over the last decade.

County Context

The four outer ring, nonmetro counties selected for site visits are: Coffee, Macon, and Marshall counties in Tennessee and Logan in

Kentucky. Each is discussed from the perspective of the importance of the auto industry, economic development strengths and barriers, and strategies.

Coffee County, Tennessee

Coffee County is located approximately 50 miles from Nashville and is served by Interstate 24, which runs diagonally through the middle of the county. It contains two cities: Manchester (population 7,700), which sits at the intersection of I-24 and Route 55, and Tullahoma (population 16,700), which is on the southwest border of the county. The county's population grew by 12 percent between 1990 and 1997, to 45,520. Public schools are reported to be of high quality for the region. Sixty percent of high school graduates enrolled in colleges in 1997. Coffee County's labor force totals 22,830, and its unemployment in 1998 was 4.8 percent, down from 6.1 percent in 1997. The annual average wage per job is \$24,600, which compares to \$32,900 in Davidson County (home of the city of Nashville). In 1998, the County invested approximately \$22.7 million in

capital projects aimed at stimulating industrial growth, up 61 percent from 1995.

From a technical capacity standpoint, two notable facilities are between Manchester and Tullahoma: The University of Tennessee Space Institute and the United States Air Force Arnold Engineering and Development Center. The Arnold Center is a ground testing facility with 4,000 employees, 19 percent of whom are engineers. Historically, it has been a primary economic driver for the county, generating \$205 million in payroll annually. In recent years, however, manufacturing's influence has grown. In 1997, the County's 80 manufacturing firms employed nearly 5,100 people. Manufacturers generated \$147.5 million in wages—roughly 27 percent of all wages. The annual average wage for these workers exceeded the countywide average by \$4,500. While the manufacturing base of the county is relatively diverse, the majority of the county's 14 motor vehicle parts suppliers are clustered in Manchester.

Tullahoma is the retail hub for Coffee County and for the surrounding counties of Bedford, Franklin and Moore. The city prides itself on strong leadership, good schools, and a high concentration of technical know-how due to its connections to the Arnold Center and University of Tennessee Space Institute. Yet it still believes it operates at a competitive disadvantage because (1) the nearest interstate highway is 12 miles away; and (2) it lacks an industrial park—though plans to develop one are in the works.

Logan County, Kentucky

Logan County (pop. 26,100) is located due north of Nashville, approximately 30 miles west of Bowling Green, and on Interstate 65. While geographically it falls within the range of activities associated with Nashville's regional economy, it naturally tends to identify with in-state economic centers such as Bowling Green and Glasgow. Historically, like many other counties in the region, Logan's economy had been driven largely by apparel manufacturing. Over the last five years, however, the county has lost more than 1,500 jobs in this sector. Employment in the MVE industry has helped replace some of the jobs, thereby cushioning the impact the decline in apparel production has had on the region.

While the state's database identifies only three auto suppliers in Logan County, the local

chamber is able to identify ten motor vehicle parts suppliers, most of which are second- or third- tier suppliers. (This suggests that auto related companies are perhaps more significant in many of the outer ring categories than the states' databases indicate.) Most of the plants are in Russellville (population 7,900), the county seat. Several more companies are in Auburn (population 1,400). These firms have a combined employment of 1,473 workers. Although a number of the suppliers are quite large, Logan County's MVE-related economy is generally characterized by firms with 100 employees or less. There are a few small machine shops in this mix that have recently expanded because of growth within the MVE industry.

Economic development officials identify the county's proximity to I-65 and rail lines, and the labor surplus generated by the decline of apparel manufacturing, as the leading factors influencing the location decisions of MVE suppliers. They also point out that the incentives offered by Kentucky counties are relatively competitive, making it a more level playing field. The County's poor water supply and wastewater management capacity were identified as critically limiting factors to industrial development, and in fact, no new manufacturing companies have moved to the county in several years because of these barriers.

Macon County, Tennessee

Located on the Kentucky border approximately 55 miles northeast of Nashville, Macon County is the most geographically isolated of the counties studied. It sits 35 miles from the intersection of I-64 and I-40. Nonetheless, it is in the midst of a growth boom. The county's population reached 17,800 in 1997, up nearly 12 percent from 1990, and all indications are that the growth rate is increasing. Historically, Macon County served as the regional retail hub to the surrounding Tennessee and Kentucky counties. It was the first county in the area to attract a Wal-Mart, and soon will be home to a new Super Wal-Mart. Between 1997 and 1998, retail sales increased by almost 100 percent, which compares to around 20 percent for both Coffee and Marshall counties.

The area is fast becoming a bedroom community, propelled by the growth of the Greater Nashville region. For example, 43 percent of the residents of the city of Lafayette,

the county seat, work outside the county. The real estate and service sector boom is creating difficulty for Macon County wage earners, especially those in the still-dominant apparel industry, to find affordable housing and keep up with rising valuations.

The growth in the service sector and the arrival of a number of new employers has reduced the county's unemployment rate from over ten percent in 1997 to six percent in 1998. The annual average wage is \$18,000. Educational attainment levels are lower than in the other counties sampled. In 1997, only 41 percent of high school graduates pursued post-secondary education.

Manufacturing in Macon County still accounts for a respectable portion of the economy. In 1998, 48 firms employed 1,350 people and distributed over \$25 million in wages, representing 35 percent of all wages. However, the annual average wage of \$18,600 for manufacturing is lower than in the other target counties. Additionally, four of the top ten manufacturers are in the apparel industry. There are only two motor vehicle parts suppliers in Macon County, the largest of which is Flex Technologies, a producer of hood releases that employs 125 workers. The other firm, Volunteer Sintered Products, produces powdered metal parts and employs 16 people.

While several interviewees credited the city of Lafayette and the county government for their strong leadership, effective management, and the ability to forge strong partnerships, they suggested that the ability to more fully link the local economy into Middle Tennessee's MVE industry is sufficiently overshadowed by the county's primary development constraints—poor access to interstate highways, lack of physical infrastructure, and affordable housing.

Marshall County, Tennessee

Marshall County is located approximately 50 miles south of Nashville along Interstate 65, about 45 minutes from Saturn's Spring Hill plant in neighboring Maury County. Marshall County experienced a higher rate of population growth than the other counties studied,

expanding 18 percent from 1990 to 1997 to a total of nearly 25,700 residents. In 1997, approximately 58 percent of the high school graduates continued with their education. Nearly half of the population (12,440) participates in the labor force, and unemployment is approximately 4.4 percent. The average annual wage in 1997 was \$24,142. In 1998, the county spent \$8.2 million on capital investments. Since 1992, all capital investment has been for expansion projects, as opposed to new development. These have generated nearly 2,200 new jobs.

Because marginal soils precluded significant agricultural development, Marshall County has a comparatively long industrial history. The manufacturing base of Lewisburg (population 9,900), the county seat, initially developed around the area's extensive cedarwood resources to create a niche in pencil production. The city has also supported a number of textile producers. Today, the county's economy is relatively diverse, as is its manufacturing base, which in 1997 comprised 52 firms. These companies contributed 69 percent of the county's total wages and employed roughly 7,100 people, or 62 percent of the annual average employment. Average annual manufacturing wages are over \$27,000. Three of the top ten manufacturers are in the MVE industry: Kantus Corporation, a plastic injection molding company, Hyperion Seating Corporation, and Walker Die Casting. Together they employ 1,663 workers.

Interviewees identified two key limitations that affect the county's ability to attract major suppliers: workforce quality and quality of life. The county's strength is its production workforce; while educational achievements and resources are about average for the region, they have been insufficient to draw better skilled, technical workers to the county. Similarly, they identified retail services, upscale housing, recreational facilities and other amenities as important factors in attracting technical workers.

Tables 7 and 8 present selected data about motor vehicles suppliers in the four target counties.

Table 7: Size of Companies by County

County	Number of Firms	Total # of Employees	Firms by Total Employment			
			49 and Under	50-99	100-249	250 and Above
Coffee (TN)	14	1,374	5	5	3	1
Logan (KY)	10*	1,473	4	3	0	4
Macon (TN)	2	141	1	0	1	0
Marshall (TN)	10	2,078	3	2	2	3

*includes seven firms not included in Kentucky's database.

Table 8: Age and Ownership by County

County	# of Firms	Ownership		Age of Firm	
		Locally owned	Non-locally owned	Est. <1985	Est. >1984
Coffee (TN)	14	4	10	4	9*
Logan (KY)	10**	n.d.	4	3	7
Macon (TN)	2	1	1	1	1
Marshall (TN)	10	5	5	8	2

*Age undetermined for one Coffee County firm.

**Includes seven firms not included in Kentucky's database.

The ten motor vehicle parts suppliers located in Marshall County employ a total of 2,078 people. Coffee County's 14 motor vehicle suppliers employ a total of 1,374 workers. With two firms, Macon County employs 141. Logan County has 10 suppliers employing a total of 1,473 people. These companies range in size from those having as few as 10-15 workers to those employing as many as 700. Marshall and Logan counties have a higher proportion of large companies than does Coffee County. Of the three Marshall County firms with more than 250 employees, one has a total of 700 workers (Kantus, a Nissan subsidiary) and two employ 450 each. Logan County's largest employers include BTR Precision Die Casting (450 employees) and Carpenter Company (500 employees). In comparison, all but one of Coffee County's suppliers employ 150 employees or less. Its largest supplier, the Japanese-owned M-Tek, employs 500 workers.

The suppliers represented in these data represent a diverse cross-section of the MVE industry. However, those specifically classified as Motor Vehicle Parts and Accessories (SIC 3714) constitute a relatively small portion of the total—six out of 36 suppliers. Machine shops and metal stamping operations are well represented. Marshall County's largest employers, Kantus and Hyperion, produce

plastic injection moldings and automobile seats, respectively. M-Tek, Coffee County's largest firm, produces door panels, while VIAM Manufacturing, which has 150 employees, produces floor mats. Largely owing to its historic industrial character, Marshall County has the highest number of firms established before 1985. In fact, four suppliers were established by 1958. Also, there is a higher proportion of Marshall county suppliers locally owned than in Coffee County.

Factors Affecting the Expansion of Greater Nashville's Motor Vehicle Industry in Nonmetro Counties

There is consensus within the region that the extension of "Auto Alley" into Middle Tennessee has had a significant positive impact on the region. The extent to which economic benefits accrue to Greater Nashville's outer ring counties, however, offers a mixed picture. Several factors stand out as key determinants in counties' ability to foster or accommodate economic growth related to the motor vehicle industry, chief among them proximity to interstate highways and access to skilled labor. This section examines these and other factors such as the presence of and/or proximity to final assembly plants and to other suppliers, access to capital and other development incentives, and

support for workforce development. Although the experiences of the counties visited for this study vary from one to the next, along with the input of other interviewees and survey respondents, they offer observations that may be useful to other rural counties throughout the TVA region.

Access to Materials and Markets

The availability of good transportation networks has played a critical role in the growth of the region's MVE industry. The former vice president of Nissan responsible for the location decisions admitted in a meeting at which a member of this project team was present that the overriding consideration in the company's site decisions was centrality to markets, and everything else was of secondary importance.

The Middle Tennessee region is well served by interstate highways and by rail. Major rail carriers, CSX and Norfolk Southern, and scores of trucking firms help connect Greater Nashville firms to national and global markets. As shown

in Figure 4, three interstate highways provide the region with one-day access to over three-fourths of U.S. consumer markets. This has contributed markedly to the region's appeal to MVE firms. Two of the four target counties in the outer ring, Coffee and Marshall, are served by an interstate highway. Logan has a relatively recently completed four-lane divided U.S. highway that connects to I-65. Two of these counties, Marshall and Logan, show higher than average employment in automotive production related firms. This is not merely coincidence; throughout the rural portions of Greater Nashville, auto-related manufacturers have gravitated towards areas with good road access. Significantly, all five of the outer ring counties judged to have superior interstate (or other four-lane road) access, also have high concentrations of MVE employment, while only four of the twelve that have limited or no access to interstates enjoy the same degree of MVE penetration.

Figure 4: Interstates in Greater Nashville



According to another TVA study, MVE companies are able to access many of the raw and semi-finished materials needed from suppliers within the TVA region, typically within a day's travel (TVA report, 1997). The introduction of "just-in-time" (JIT) production systems to automotive manufacturing contributed substantially to the clustering of automotive manufacturers and suppliers in Greater Nashville. This is a cost-cutting strategy that relies on timing the production and delivery of component parts to the needs and schedule of the manufacturer. While reducing warehousing and associated costs, JIT escalates the importance of proximity and transportation, prompting suppliers to locate close to OEMs and first-tier suppliers, often concentrating near interstate highways.

It is not unusual, for example, to find firms that produce extremely dense and/or bulky products that would incur high transportation costs locating close to assembly plants (Klier, 1998). Hyperion Seating Corporation in Marshall County, which supplies Saturn, is a good example of this phenomenon. As the number of OEMs in the Southeast has grown, so has the chain of suppliers seeking to avail themselves of JIT siting needs. Although many of the MVE suppliers in the region are clustered around major vehicle companies, many of them also take advantage of the region's location and transportation networks to access other markets within the larger "Auto Alley." Some argue that this factor is as much a driver of the recent growth of second- and third-tier suppliers as is the need for proximity to the region's own OEMs.

Labor Market Considerations

In 1998, automotive manufacturers and suppliers employed 18 percent of Tennessee's manufacturing labor force, representing an annual payroll of approximately \$3.2 billion (Fitzgerald, 1998). According to data compiled by TVA, a breakdown of MVE occupational categories for the region shows that 52 percent of occupations are in the Operators, Fabricators, and Laborers category. Precision Production workers comprise 21 percent, and Professional Specialty occupations (such as engineers, scientists, and computer programmers) and Executives, Administrators, and Managers account for a combined 15 percent of the industry's labor requirements (TVA report,

1998). Favorable factors related to the region's labor force have contributed to the industry's growth in Greater Nashville. Wages in the auto cluster in the region are reported to be approximately 20 percent below national rates, and estimated to be as much as 40 percent below wage rates in Michigan's auto cluster. Like many Southern states, Tennessee is a right-to-work state, making it more difficult for organized labor to establish a strong foothold and keeping wages lower on average than in Midwestern and Northeastern states. On the other hand, one person noted that within the region wages paid by auto suppliers tend to be 20 to 30 percent higher than the average starting wage across industries. While no hard data were provided, a number of interviewees suspected that the influx of auto companies coupled with tighter labor markets has resulted in an upward creep of wages generally.

Others argue that there are noticeable wage and cost differentials within the region's MVE industry and that this has an impact on the growth of suppliers in outer ring counties. For example, Nissan, like most foreign-owned auto manufacturers, created its own network of suppliers, many of which also are foreign owned. A sizable number of these operations employ advanced technologies and production methods. Although these are typically not union shops, wages, benefits, and career advancement opportunities are reported to be very competitive. Marshall County's Kantus Corporation, where the average wage is \$40,000, exemplifies this. Saturn, with its substantial union presence, pays considerably higher wages than most suppliers, while producing a relatively low cost product. The company "squeezes" suppliers by demanding low cost products, and one key way suppliers can achieve the costs expected is by paying lower employee wages and/or benefits. It is argued that the expansion of the Saturn supply chain is substantially hindered by this dynamic, and exacerbated by tighter labor markets generally.

Additionally, policy makers interested in promoting retention and expansion strategies may question the degree to which expansion of the Saturn supply chain would support locally oriented economic development objectives since past experience shows that Saturn imported a considerable number of workers from General Motors' Midwest plants.

Interviewees in each of the counties studied cited tight labor markets as problematic for market expansion. While there is a consensus that the good work ethic and ready labor pool available in the region contributed to the development of the MVE industry, past emphasis on the availability of cheap labor is now adversely affecting growth potential. Many suppliers are having difficulty identifying skilled labor, particularly in production occupations. Macon County, for example, is an area that has experienced a considerable out-migration of trained and educated workers, while the decline of the apparel industry has added to the supply of low-skilled workers. Some suppliers credit their willingness to pay good wages as the reason for satisfying their labor requirement but are tentative about the future if market tightness persists. For example, Volunteer Engineering, a metal stamping firm that supplies Nissan, GM, Mercedes-Benz and BMW, was drawn to Coffee County by a well-educated labor force. However, as labor markets tighten, continued access to quality labor challenges the company's growth potential. In an effort to retain trained workers, the company has improved its benefits packages and instituted shift changes that allow four-day work weeks that are attractive to employees.

A number of companies have turned to temporary employment agencies to help them find workers, but several lamented the decline in the quality of workers available through these agencies. Most of the companies with which we spoke expect to grow in the future but are uncertain about how they will satisfy their labor requirements under such tight conditions. A number of companies reported knowing of suppliers that have had to send work to other plants or were unable to expand because they could not find trained or experienced workers. In some respects, the ability to attract workers is also tied to the level of cultural amenities that are available near plants, particularly at the professional and managerial level.

Workforce Development

Public post-secondary education in Tennessee is organized under the Tennessee

Board of Regents, which has authority over state universities, two-year community colleges and the state system of Technical Institutions and Area Vocational Schools (generally referred to as Tennessee Technology Centers). Historically, the community colleges have concentrated on transfer programs and the technical schools on secondary and non-credit or certificate adult vocational education. Now both community colleges (CCs) and Tennessee Technology Centers (TTCs) offer general training services, including basic skills and job readiness training in standard technical fields, such as Automotive Technology, Computer-Numerically Controlled machines, and Precision Metals. In fact, considerable overlap has developed in specialty training programs for manufacturing and industry offered by TTCs and community colleges, and CAD/CAM, Machine Tool Maintenance, PLC, and Tool and Die Apprenticeship training may be found within both institutions.

Table 9 lists the higher education institutions and affiliated resources located in the three Tennessee counties visited and some adjacent counties. It provides a snapshot of the types of resources that could potentially benefit auto suppliers.

The degree to which technology centers and community colleges work with motor vehicle suppliers varies. Columbia State Community College (CSCC), for example, created the Center for Economic and Community Development as an umbrella under which it could address continuing education and customized training needs. It appears to have resulted from a personal commitment to these objectives by the college president. While the college has worked with auto suppliers, assistance focuses on management and administrative needs, as opposed to technical training. The staff of the center is interested in working with TTCs to develop joint packages of services for firms, but this is not fully developed at this time. Further, despite the creation of the new center, CSCC has had only marginal success in becoming an active player in the area's economic and industrial development.

Table 9: Selected Higher Educational Resources

County	Institution
Bedford	Tennessee Technology Center at Shelbyville
Coffee	Motlow State Community College University of Tennessee Space Institute
Macon	None
Mauzy	Columbia State Community College Small Business Development Center
Marshall	Columbia State Community College (satellite) Tennessee Technology Center (in development)
Rutherford	Middle Tennessee State University Tennessee Technology Center at Murfreesboro Small Business Development Center
Sumner	Volunteer State Community College
Trousdale	Tennessee Technology Center at Hartsville Small Business Development Center

Volunteer State Community College (VSCC) in Sumner County is primarily a transfer college. It provides some support to industry in general, and to the auto industry specifically, in cooperation with Nashville State Technical Institute. VCSS upgrades skills for some auto suppliers, and it provided pre-employment assistance and readiness training to Bosch Braking System. The community college also has a good relationship with Hartsville Technical Center, which offers expertise in technical areas that Volunteer State lacks. Typically, VSCC Business and Industry Liaison brokers these arrangements; however, its customized training budget is not large (approximately \$100,000). One interviewee suggested that customized training is not very well developed in Middle Tennessee; while it may be included as part of incentives packages, it is typically not done regularly. None of the training providers identified in this report explicitly targeted the MVE industry or was a part of any strategic development plan to help expand the network of suppliers in the region.

There was a consensus among a number of interviewees that more should be done to develop the capacity of the TTCs to improve the services they can offer to companies and to include them in economic development and recruitment discussions. Implicit in this is addressing the control of federal training funds by community colleges and increasing the orientation of community colleges toward customized training. Some interviewees acknowledge that there has been a small shift

toward higher skill vocational training, such as for occupations that support advanced manufacturing, and that this could potentially enhance the role of TTCs in industrial development. However, others point to structural limitations in Tennessee’s higher education system that perpetuate the under-utilization of TTCs, such as the reluctance of community colleges and technology centers to pursue articulation agreements because of competition for full-time equivalent (FTE) enrollments.

Although there is strong sentiment on the part of auto suppliers in the region for increased workforce development, there are indications that suppliers do not regularly avail themselves of these services. Quite a number of firms we surveyed conduct their training in-house. Additionally, few firms suggested that the availability of workforce development resources was a significant siting determinant. Meritor Automotive in Smith County, for example, mainly provides on-the-job training rather than contracting with educational institutions or vendors. When it has used outside providers it has worked mainly with VSCC for basic skills training. While the outcomes were successful, the company could not afford the downtime required for workers to attend training. Volunteer Engineering uses the TTC at Shelbyville, which provides both technical and management training. The primary limitation is the TTC inability to conduct training on-site and the difficulty workers have getting to classes that are typically held in the evening on a

campus that is 25 miles away. These experiences raise questions about the cost sharing and customization of training.

Wagner Brake in Scottsville, Allen County, received support under the Kentucky Rural Economic Development Act (KREDA), which targets new and expanding manufacturing firms operating in economically depressed counties with tax credits for capital expenditures. Here, too, the firm does all its training in-house, except for highly specialized training on sophisticated equipment where equipment vendors provide the training. So far, the company's expansion opportunities have not been significantly hindered by the area's tight labor market; but it also must draw from a wide commuting radius. This appears to be the most immediate strategy for many firms facing skills shortages attract additional workers from greater distances, as opposed to organizing with other firms to influence the responsiveness of the workforce development system.

Some critics suggest that the region's lack of trained production and technical workers is partially due to the orientation of high school guidance counselors, most of whom are reported to track students with math ability toward four-year colleges and away from technical careers. No one interviewed for this assessment indicated that there were any significant partnerships with K-12 educational institutions to develop a pipeline to automotive manufacturing jobs.

The University of Tennessee is emerging as a central player in Tennessee's automotive industry, primarily through the activities of the Institute for Public Service, which does R&D for the industry and also administers Tennessee's Manufacturing Extension Partnership (TMEP), a program funded by the National Institute of Standards and Technology. University funding, additional state funding, federal support, as well as from fees for customized training and services support the TMEP. It has a fairly extensive program targeted to auto suppliers, the primary focus of which is on existing companies. TMEP partnered with Saturn to help build its supplier network, conducting outreach to firms to make them aware of TMEP presence and of new practices in the field. In 1997-98, Saturn asked TMEP to work with a specific set of suppliers, thus creating a formal three-way partnership between Saturn, selected suppliers, and the TMEP. The TMEP estimates that it works with 400 to 800 firms a year. It also partners

with community colleges to fill training gaps it cannot handle in-house, mainly on the management and administrative sides, and with the state's Department of Economic and Community Development to conduct outreach to and provide information for firms. Together, for example, they hosted the first conference of automotive engineers and suppliers to be held in the Southeast.

Based on its work in the field, TMEP staff cited labor force issues as critical to further expansion of the MVE suppliers in outer ring counties. While higher wages are a successful inducement for many workers to endure extensive commutes, limitations are fast approaching. Although many companies agree that they could better handle tight labor conditions by implementing improved technologies, many cannot afford the time or cost associated with this. Moreover, they are apprehensive about being able to access the higher skilled workers needed to implement new technologies. This dynamic is particularly troublesome for smaller companies that experience high turnover, largely due to first-tier suppliers and OEMs raiding their companies for trained workers.

Economic Development Environment

Very few economic development resources are targeted specifically to support auto suppliers. Whether at the county or regional level, support of such firms appears to be mainly ad hoc. But then none of the firms interviewed indicated that the availability of development incentives was the sole criterion in selecting one county over another. To understand this, it is worth examining the economic development environment in the region, as it varies across and within the counties. Some officials focus on retaining and strengthening indigenous companies, while others proactively emphasize recruitment. Within this mix, some are willing to take whatever development funds they can get. While there are no easy generalizations, a number of observations illustrate the situation.

The Tullahoma Chamber of Commerce in Coffee County is the only example found of an economic development entity that explicitly targets the MVE industry in its growth strategy. Five years ago, the Chamber convened a strategic planning process that resulted in four target sectors: Printing and Publishing, Rubber

and Plastics, Machinery and Computer Equipment (all of which could hypothetically feed the MVE industry), and Transportation Equipment. The Coffee County Industrial Development Board, on the other hand, does not specifically target the auto industry, although it recently successfully recruited several such firms into its new industrial park. This makes for a very competitive climate and presents significant challenges for Tullahoma, which is limited by finite land options and finds itself in competition with its own and neighboring counties.

In Marshall County, the City of Lewisburg made a decision not to offer extensive incentives, though in the past it was heavily oriented toward recruitment incentives. (It reportedly gave Hyperion Seating over \$1 million but now acknowledges marginal return on the investment in terms of wage progression for local workers.) Lewisburg is fortunate to have a number of locally owned firms that are committed to the area. With a focus on job retention, economic development resources serve them. Although Lewisburg does not explicitly target auto part suppliers, the city is laying the groundwork for broad economic growth that could accommodate the cluster. For example, in response to survey results that revealed the pervasiveness of workforce development needs among local firms, the City's Office of Industrial and Community Development is brokering the development of a technology center in the downtown. The technology center will target under-served small manufacturers and suppliers. The development of the technology center is also part of a development strategy aimed at improving physical amenities and quality of life factors in the city, which, it is hoped, will do much to attract higher skilled workers to the area. Because of Lewisburg's proximity to Interstate 65 and its strategic location between Nashville and Huntsville, officials believe that the city is well suited for second-tier suppliers.

Logan County's Chamber of Commerce likewise has an emphasis on retention and expansion of existing firms. Although they do not preclude recruitment strategies, they typically rely on state and regional entities since they do not have resources to actively recruit on their own. The county is included in the ten-county Barren River Area Development District (BRADD), which provides technical assistance in planning and administration for several state

and federal agencies, and assists counties and cities in accessing public funds for infrastructure and industrial development. The Kentucky Advanced Technology Institute in Bowling Green offers courses geared toward the auto industry, both classroom and on-site training, and Western Kentucky University conducts needs assessments for manufacturers. None of the economic development entities in the region, however, specifically targets the auto industry.

Macon County is part of the Four Lakes Regional Industrial Development Authority region, which includes Smith, Sumner, Trousdale and Wilson counties. Like Macon County, Sumner and Wilson counties are considered bedroom communities of Nashville, though Sumner has its own mature manufacturing base. While unemployment is generally low, over 7,000 workers were displaced with the closure of a nuclear power plant. Reuse efforts have been marginal, with the major success being an incubator that employs about 130 workers. With challenges such as these, it is not surprising that regional economic development officials are willing to "take anything they can get" in the way of industrial development, or that auto suppliers (or any particular industry) are not strategically targeted. Many local development players are reported to engage in recruitment strategies. Although some are shifting to retention strategies, none is reported to have a long-term economic development plan. The lack of resources and technical capacity to do the necessary analysis to determine industrial development target was cited as a considerable limitation.

To supplement information from the four counties visited, the project team conducted a survey of economic development officials, chamber of commerce representatives, and elected officials in eight other counties in the outer ring to learn more about economic development strategies and trends related to the auto industry, but with mixed responses. Not surprisingly, half of the respondents reported a high contribution from motor vehicle parts suppliers to the local economy. Only Trousdale County reported a low contribution. Respondents indicated wages offered by motor vehicle parts suppliers to be about average, with the exception of Bedford County, which reported above average wages, and Cannon County, which reported below average. Five of the eight counties reported being aware of firms

in their counties that have expanded because of growth opportunities directly related to within the MVE industry. They are Bedford (2 firms), Humphreys (3 firms), Montgomery (3), Smith (2), and Trousdale (1).

The survey asked about counties' economic development activities targeted to the MVE cluster. Bedford County reported that it proactively works with existing firms on retention and expansion strategies, as well as with small networks of suppliers. It also engaged in recruitment activities over the last year, pitching to 20 companies, six of which were MVE-related. Thirty percent of Cannon County's recruitment efforts also focus on MVE suppliers. By far, Montgomery County (technically a metropolitan county due to its inclusion within the Clarksville-Hopkinsville MSA) invests the most resources in recruitment strategies of the eight counties. It reported conducting approximately 100 presentations over the last year, 30 to 40 of which were made to MVE-related companies. While the county engages in the range of promotional activities that support recruitment, it did not report significant ongoing specialized supports for the industry. Houston, Smith and Trousdale counties reported not engaging in any recruitment activities.

Although the State of Tennessee and a number of its counties have broadened their economic development strategies in recent years to include a greater emphasis on retention and expansion of existing firms, a number of interviewees pointed out that considerable allegiance to the recruitment model of economic development remains throughout the region. At least one respondent reported an inability to compete with neighboring counties that offer substantial incentives and cited this as a primary barrier to economic growth within the auto sector.

When asked to identify barriers that reduce their county's ability to benefit from the growth of the MVE industry in Greater Nashville, survey respondents identified an inadequate supply of skilled labor (Bedford, Maury, and Houston) and lack of access to interstate highways (Houston and Montgomery) as the most constraining barriers. Two counties, Trousdale and Smith, did not report any barriers, perhaps an indication of the low priority these counties place on recruitment

generally and the targeting of the MVE industry in particular.

Repeatedly, economic development officials interviewed by the project team raised concerns about the impact of Tennessee's past decision to promote itself as a haven for those wishing to employ cheap labor, suggesting that this strategy now limits the state's ability to attract not only high tech firms, but any high wage industry. In an attempt to change this practice, economic development officials in Greater Nashville are shifting incentives away from low-wage operations to higher-wage industry, targeting food, plastics, and other fast-growing industries. Motor vehicle suppliers are not specifically targeted. However, many of the counties in the region are reducing the emphasis they place on incentives and/or are linking incentives to wage levels. To the extent that economic development officials are considering auto suppliers as a target industry, they are asking whether these companies will elevate the skill level of the region and help attract other firms, and whether the firms are diversified or adaptable enough to survive a downturn in the auto industry. Officials in Lewisburg, for example, are attempting to place the city in the pathway of the region's high tech growth, and to capitalize on the arrival of a large Dell Computer facility in Nashville. Macon County officials are examining strategies to retool the infrastructure that supported the apparel industry to meet the needs of plastics manufacturers.

Findings and Lessons for Other Rural Economies

In Middle Tennessee and its adjacent Kentucky counties, the motor vehicle cluster has long tentacles, reaching into much of the region. Nonmetro counties have held their own in terms of attracting firms and number of auto related employment relative to metro Nashville and recently outpaced the Nashville MSA counties. In fact, relative to their size and population, nonmetro counties have done better than the metro counties in adding auto suppliers. The industry, though lower wage than comparable companies in the Midwest, pays more than many of the non-durable goods producing industries it is replacing, and thus, has raised average wage levels in the nonmetro counties.

There are a number of impacts that a regional customer hub—in this case, auto final assembly plants—can have on its rural

outreaches: direct employment or purchase of supplies or services, investments and expenditures in surrounding areas, and purchases from lower level less specialized suppliers to higher level suppliers, such as tool and die makers or metal fabricators. Table 10 describes these and other impacts in more detail.

Assessing all of these impacts was beyond the scope of this project. Most of the information collected by the project team addresses the direct benefits of employment and suppliers. Little is known about the employment and growth of lower tier suppliers, many of which are not included in the states' auto

supplier databases. Logan County provides an inkling of the scale and importance of these secondary and tertiary suppliers. When local economic developers added their knowledge of second- and third- tier suppliers to the number of auto related companies listed in the state's database the total number of auto related companies in the county rose from three to ten. The only way to learn more about the full range of auto suppliers is a comprehensive direct survey of employers, which also was beyond the scope. Findings regarding specific dimensions of the auto cluster follow.

Table 10: Potential Spillover Benefits

Types of Impact	Manifestation of Impacts	
Employment	Direct	Commute to OEMs
	Contract	Contractors who commute to OEM
Investments in suppliers	1 st Tier	Sell directly to OEM
	2 nd Tier	Sell to 1 st Tier suppliers
Multipliers	Taxes	Payroll, corporate, personal, sales taxes
	Investments	Investments, donations by employees or companies
	Expenditures	Expenditures by employees or firm
Support services	Specialized	Services customized to auto industry or suppliers
	Generic	Services with customers within cluster
Other suppliers	Lower Tier	Firms whose customers include suppliers

Access

Cluster spillover from urban clusters into the periphery has been high in counties where conditions are attractive to auto suppliers. Low costs (land and labor) alone are no longer sufficient, although still a consideration, for attracting companies. Those outer ring counties that are fortunate enough to be crossed by an interstate highway have some advantages and generally employ more aggressive targeted recruitment strategies to attract motor vehicle suppliers. Interstates and other four-lane roads enable a smoother and faster flow of goods into and out of the plants and of workers who may commute. Middle Tennessee is crisscrossed by three interstates (I-24, I-40, and I-65), and therefore most of the surrounding counties do have good access. This makes it easier to reach the other automobile manufacturers, such as those in Kentucky or northern Alabama. The 8 out of 17 counties (47 percent) without any interstate highway, or where an interstate crosses

just a corner—Hickman, Houston, Humphreys, Macon, Stewart, Trousdale, Logan, Kentucky, and Allen, Kentucky—together account for only 15 percent of the suppliers and 13 percent of the supplier workforce in the region's outer ring. Thus, access to interstates seems to matter to new companies looking for a site, which has been true throughout the South for at least two decades (Rosenfeld, Bergman, and Rubin, 1985).

Disparate Nature of the Cluster

Counties are aware of the growth potential of the auto industry, but neither the economic development agencies nor the firms generally think in terms of clusters, perhaps due to the nature of this particular cluster. Because its defining characteristic is the customer, the members represent a wide range of products, technologies, and needs. They have fewer reasons to cooperate or ability to gain from external economies than clusters that have more

homogeneous production processes. This cluster includes, for example, companies that produce metal, plastic, glass, rubber, chemical, and fabric products. Further, most outer ring counties are more reactive than proactive in terms of recruitment. Because demands made by customers on second- and third-tier suppliers are high, the industry is difficult for entrepreneurs to break into. Perhaps as a result, recruitment is the more common development strategy.

Specialized Services

There are few of the specialized services often associated with clusters in Greater Nashville. Training programs and small business support programs tend to assume and target highly diversified economies, again perhaps because an auto supply chain cluster is diversified in its needs. Labor shortage—skilled and unskilled—is the single most common need and the major barrier to further growth in the cluster, but few solutions have been posed.

Recommendations

The actual supply chains of the auto industry can only be identified if companies are willing to reveal their purchasing patterns, which many hold confidential and are reluctant to share. Most analyses of auto clusters simply use input-output tables, which are estimates about the inputs to (purchases by) industry sectors from other sectors—generally based on decade old data. Little is really known about the actual business transactions along supply chains within the Middle Tennessee region, i.e., what the companies that are able to supply the industry sell inside and outside of the region or to non-auto customers. Similarly, many companies not listed as suppliers by the state Department of Economic and Community Development still may sell a significant part of their output to the industry. An extensive survey of a sample of second-, third-, and even fourth-tier suppliers in rural counties would reveal longer supply chains and the intensity of activity. This may prove to be worth the effort to better understand the cluster. A regional inventory of suppliers and their competencies in nonmetro counties would be both an effective recruitment tool and a means for identifying common needs.

Workforce skills and shortages head the list of needs and problems for most companies.

Even though the cluster is diverse and members need a wide range of competencies, most manufacturers cite as most important to them a set of common skills often called “soft” (e.g., communications, problem solving skills, and teamwork) in contrast to “hard” (e.g., machine operation or process control). We found no strong connections between the school systems and the motor vehicle and equipment industry. Saturn, for example, relies heavily on its internal Saturn University for training. There are few examples of groups of suppliers working together to influence workforce development systems and policies.

There is a need for better connections between companies and schools (both secondary and postsecondary), perhaps first by convening auto related companies with local educational institutions to articulate their needs and help develop responsive programs. To address labor shortages, the state ought to examine how well the education and training system supports the cluster in (1) programs for youth, (2) second chance programs for underemployed adults, and (3) incumbent worker training. This should include a systemic review of the workforce development incentives in place, particularly for small firms.

Clusters often are described as production systems that are activated by social interactions. Thus, social infrastructure is considered an important attribute of an effective cluster. Little evidence was found of such a social system representing the cluster. Rather, companies relate to their own industry associations, which generally are national. One unifying force for supply chains, and developed in Wales through its Regional Innovation Strategy, is to build supply chain associations, ostensibly for training but also to provide avenues for cooperation and networking. Supply chain networks, facilitated by the Tennessee MEP and other brokers, could increase opportunities for suppliers in rural counties, which are, on average, much smaller than urban suppliers, to compete. (Nissan operates a supply chain association for its suppliers in Middle Tennessee that might be examined as a model.)

From the individual nonmetro county perspective, there are several important considerations that should be taken into account in determining the viability of a cluster strategy. Chief among the determinants that affect firms' siting decisions is the proximity to good roads

and interstates, especially for those firms utilizing just-in-time production techniques. The ability of the outer ring counties to support suppliers is also affected by quality of life considerations that affect the ability of firms to attract trained workers to an area. Additionally, these counties' ability to offer a trained or "trainable" workforce is also key, since the presence of workers no longer holds much sway with many auto suppliers.

While some local economic developers are aware of the concept of clusters and the value of specialization and building on existing strengths, most are not. The state has conducted various cluster studies but they only describe the scale and contours, not the dynamics, of clusters, stopping short of suggesting any actions. Local officials need training and more information about how to best take advantage of clusters in practical terms.

II. The Importance of Critical Mass: A Micro-cluster in Kentucky

The houseboat industry is concentrated in a very rural area of south central Kentucky. There are other boat manufacturers in Kentucky and Tennessee, but because of the specialized nature of the houseboat industry (building a residence that floats rather than a craft that carries people), the Kentucky cluster has little in common with the others in the general region. Thus, the analysis was confined to the narrowly defined and localized cluster. An earlier analysis investigated the seedbed potential, i.e., the ability to generate a cluster, in rural areas. This report focuses on the advantages to the firms and region that is derived from a relatively small cluster to determine what benefits depend on a critical mass of firms and what benefits can be derived at even a small scale.

Introduction

South central Kentucky—which is rural and fairly isolated—might seem like an unlikely home for the largest concentration of houseboat manufacturers in the United States. Yet the four-county area near Lake Cumberland (with over 1,200 miles of shoreline, one of the ten largest lakes in the country) is not only the undisputed capital of houseboat manufacturing, producing more than half the country's houseboats each year worth more than \$100 million in sales,⁴ it is the birthplace of the

industry. Somerset Houseboats (located in the city of Somerset) incorporated as the first houseboat manufacturer in the country in 1953.

While several companies have been making houseboats in the region for decades, the current dominance of the industry by this region is relatively recent. Four new competitors opened their doors since 1994 and production levels and revenues are at their highest levels ever. Most recently, another houseboat producer opened not far from the region in London, about 35 miles east of Somerset. All of these companies build "full aluminum hull" houseboats.

South central Kentucky is not the only part of the TVA region with houseboat manufacturers. Tennessee is home to five houseboat companies, although they are mostly smaller and less geographically clustered than the houseboat companies in south central Kentucky. Three companies are spread up and down Middle Tennessee, and two are in the eastern part of the state. All but one of the Tennessee companies produce what are referred to as "performance fiberglass" or "pontoon based" boats, as described later. There has not been the same recent entrepreneurial energy in Tennessee houseboat manufacturing; the newest of the companies opened its doors in 1986. This is not surprising given the fact that the market segments these companies serve have not experienced the same growth as the full aluminum hull segment.

Small areas in Indiana and British Columbia also show concentrations of houseboat firms, but the largest of these agglomerations is only three firms, making the Kentucky cluster the most significant for the industry (Lackey, 1998).

How and why did the Kentucky cluster develop and grow in this rural area of a state whose economic development is dominated by industrial recruitment? What drives the cluster and are there lessons that might help other rural regions benefit from economic specialization?

The answers are, as is usually the case with industrial agglomerations, complex. Three things are certain. First, this is a "home grown" cluster, derived almost entirely from local entrepreneurs and local capital. Second, nearby Lake Cumberland is a very important driver behind the local industry. Third, the cluster is firmly grounded in capitalistic opportunity. Faced with strong demand for a product that is relatively straightforward to manufacture (one

local official described local houseboats as “basically houses built on top of aluminum hulls”), managers and co-owners of the pioneer houseboat manufacturers periodically have resigned or split away to start their own companies, sometimes leaving significant rancor behind them.

It is important to understand more about the history of this rural area to appreciate the impact of the houseboat cluster.

Kentucky Hill Country

Located on the western edge of the Appalachian mountains and on the banks of Lake Cumberland, south central Kentucky is doing better economically than it previously has, though it remains poorer and more isolated than most of the country. The largest city within 100 miles is Lexington, and no interstate crosses through the four counties of Clinton, Pulaski, Russell, and Wayne. Somerset, with 12,618 residents, is the hub of the region as well as the most prosperous and fastest growing city. Until the mid-1900s, the region depended on a diversified agrarian economy that included grain, vegetable and some tobacco crops, as well as cattle. Like many other southern rural areas, manufacturing arrived in the 1960s, primarily in nondurable goods sectors such as textiles, apparel, furniture, and wood products. Most of the new companies were branch plants in search of lower costs. Today, the region remains heavily dependent on manufacturing. Wayne County estimates that 25 percent of its jobs are in manufacturing, compared to about 18 percent for the nation. While employment in the apparel industry has declined dramatically over the last decade, wood products, which includes houseboats, continue to thrive, and electronic components and other auto-related firms are increasingly moving into the region. These new jobs, though lower in overall number, generally pay better than the apparel jobs they replaced.

Despite the relatively strong manufacturing base, the area still has its economic troubles. Poverty rates in Wayne and Clinton counties are above 30 percent, well above the national average of 12.7 percent.⁵ In Russell County, the most mountainous and isolated of the four

counties, the 9.5 percent unemployment rate is more than twice the national average.

Unemployment rates range between 4 and 5 percent in the other three counties.⁶ One economic development official described the four-county region as “moderately prosperous but with pockets of continued poverty.”

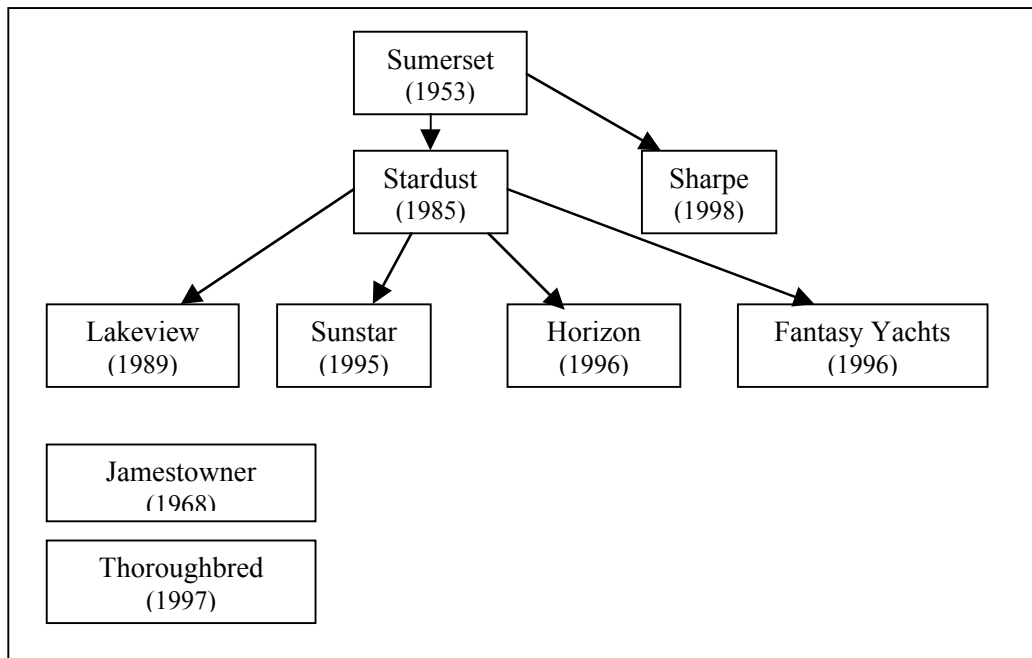
All together the houseboat firms employ more than 900 people, a significant number considering that the combined civilian labor force in the four counties is only 42,000⁷. Wayne County has the most intensive houseboat presence, with five companies employing more than 600 people—in a county with a labor force of only 7,600. One economic developer said that given the steep decline of the apparel industry, the houseboat companies—and other new manufacturing sector jobs—have eased what otherwise would have been a tremendous blow to the region’s economy.

All in the Family

As mentioned, the cluster traces its origins to the establishment of Sumerset Houseboats in the 1950s. The Jamestown in Russell County began operation in the late 1960s. Then, in the mid-1980s an unfortunate occurrence led to an unexpected outcome. A fire at Sumerset caused the plant to close its doors for a brief period. As a result, with encouragement and financing assistance from industrial developers in Wayne County, the former sales manager of Sumerset and four partners established Stardust Houseboats in Wayne County in 1985. By the early 1990s, conflicts among the partners of Stardust resulted in three partners leaving the company and, at different points, starting their own firms—Sunstar, Horizon and Lakeview (Lackey, 1998).

Surging demand also made these start-ups possible. Later, a high level manager at Stardust left that company to start Fantasy Custom Yachts. More recently, original owner of Sumerset, Jim Sharpe, sold the company to a new owner. Soon thereafter Sharpe’s son started his own houseboat firm, called Sharpe. Figure 5 shows these “familial” relationships among the region’s houseboat firms.

Figure 5: South Central Kentucky Houseboat Manufacturers' "Family Tree"



This isn't Your Father's Houseboat

For the past ten years, buoyed by a strong economy and soaring stock market, the houseboat market has been on the upswing. With no exclusive category for houseboats, the National Marine Manufacturers Association does not know exactly how many of these boats were manufactured last year, although *Houseboat* magazine estimates the number at around 1,000. Given that consumers bought more than 600,000 boats in total in the United States in 1998, the houseboat market is quite a small share of all the entire boat market. But the average houseboat sold for around \$200,000, compared to the average outboard boat price of \$6,800, which means that the income from houseboats is approximately \$200 million a year—about 15 percent of the total value of the U.S. boating market.⁸

People purchase houseboats for recreation on placid lakes. Because the boats ride close to the waterline and do not accommodate waves or swells of any magnitude, only calm lakes are suitable. Many owners treat them as vacation homes (they qualify for second home mortgages), and the large houseboats rarely go more than 100 feet from their docks, according to one firm owner. There also is a substantial rental market for houseboats. Typically, marinas

on lakes that are popular with houseboaters own a fleet, which they rent on a weekly basis to vacationing families. Short-term rental boats are generally smaller and more likely to be taken out to explore lake estuaries and fingers. Other than Kentucky and Tennessee, Lake Cumberland area houseboat manufacturers consistently mention their main markets as Arizona (Lake Powell), Georgia, Arkansas, Texas and California. Exporting of houseboats is exceedingly rare. There is an active resale market for houseboats with manufacturers reporting that, like homes on land, some houseboats appreciate with time.

While 40 years ago companies started out building relatively small and standardized houseboats with modest sleeping and living quarters, the trend over the past ten years among Kentucky manufacturers has been toward customized, larger, and more luxurious full aluminum hull boats. Two-story craft 100 feet long and 18 feet wide are not uncommon. The largest boats have sleeping accommodations for up to 12 people and often include amenities such as high-end home entertainment centers, spiral staircases, hot tubs and water slides.

According to the editor of *Houseboat* magazine, three distinct categories of houseboats are manufactured in today's market—full aluminum hull boats, pontoon-based boats, and

performance fiberglass boats. The Kentucky houseboat companies build custom full aluminum hull boats, all exhibiting a distinctive look and using the same essential design and

materials. These boats use materials and designs common in the recreational vehicle (RV) and construction industries. Table 11 describes these different houseboats market segments.

Table 11: Houseboat Market Segments

Full aluminum hull, custom made	Style common to Kentucky firms. Average length of about 72 feet but can be as long as 110 feet. Widths range from 16 to 20 feet. These are the most luxurious houseboats, are generally customized, and have the most home-like amenities. Factory direct sales. Usable for 20 to 40+ years. Can appreciate in value. This niche is experiencing the greatest growth.
Performance fiberglass	Track better in rivers that have current. These are smaller—35 to 60 feet in length—production model fiberglass boats and are more expensive per foot to manufacture than full aluminum hull boats because they have fiberglass frames. Dealer networks. Do not retain their value as well. This is the slowest growing houseboat niche.
Pontoon	Production model pontoon boats in which a cabin essentially sits atop a pontoon log instead of an aluminum hull. These boats average about 35 to 40 feet long. Considered entry-level boats because they are less expensive per square foot; however, they generally are of use for only about 20 years and do not retain their value very well. Dealer networks. This market has grown somewhat in recent years.

Firm owners have little information about the true size or market potential for houseboats—or even of various segments within the market—because none has undertaken or contracted for the necessary market research. Lacking good information, there seems to be a general sense or feeling among companies that the market is near saturation. Yet when pressed, they admit this is not based on hard data. A sense that the “other shoe might drop” and the tremendous market demand might falter was palpable when talking with houseboat companies, particularly among new companies.

Further complicating the marketing issue is the “seasonality” of the houseboat market. Most customers want to take delivery of their boat in

the spring in order to avoid paying slip fees during the off-season. This can cause uneven production demand, and as a result firms sometimes offer incentives to those willing to take delivery of their boats in the off-season. Table 12 profiles the houseboat companies in south central Kentucky, other parts of Kentucky and Tennessee by company and their market segment.

The balance of this study focuses on the characteristics and issues facing the houseboat companies in south central Kentucky since they represent the largest and fastest growing houseboat niche and are located in sufficient proximity to one another to examine effects associated with clusters.

Table 12: Houseboat Manufacturers in Kentucky/Tennessee

	Began Operation	Employees (approx.)	Boats/year (approx.)	County	Segment
South Central Kentucky					
Fantasy Yachts	1996	115	35	Wayne	Full aluminum hull
Horizon Yachts	1996	75	40-45	Wayne	Full aluminum hull
The Jamestown	1968	na	50	Russell	Full aluminum hull
Lakeview Houseboats	1989	100	100	Wayne	Full aluminum hull
Sharpe Houseboats	1998	85	40	Pulaski	Full aluminum hull
Stardust Cruisers	1985	250	100	Wayne	Full aluminum hull
Sumerset Houseboats	1953	200	150	Pulaski	Full aluminum hull
Sunstar Houseboats	1995	50	25	Wayne	Full aluminum hull
Thoroughbred Cruisers	1997	15	5	Clinton	Full aluminum hull
Rest of Kentucky					
Paradise Custom Yachts	1998	na	na	na	na
Pluckerman Custom Boats	na	15	2-3	Jefferson	Full aluminum hull
Tennessee					
Aqua Chalet	1986	75	30-50	Claiborne	Pontoon & full hull
Catamaran Cruisers	1982	50	200	Maury	Pontoon/catamaran
Gibson Performance	1968	70	100-150	Davidson	Performance fiberglass
Harbor Master	1958	40	12-14	Sumner	Performance fiberglass
Norris Yachts	1993	3	1-2	Campbell	Full aluminum hull

Kentucky firms advertise their building prowess in *Houseboat* magazine and exhibit at various boating shows. Some owners, however, complain that general boating shows do not provide good leads because their market differs substantially from, and indeed is overwhelmed by, markets for other types of boats such as ski and fishing boats. A first ever “houseboats only” trade show in Nashville early in 1999, sponsored by *Houseboat* magazine, attracted 9,000 people; it will be repeated in 2000 in Louisville. Several manufacturers mentioned its value in generating sales.

Full aluminum hull houseboat companies sell their products directly to boat owners and rarely use brokers or distributors. Individuals interested in buying a boat typically visit the manufacturing plant in person, design their boat in consultation with the company, and place a ten percent deposit when placing the order. Delivery of the boat occurs in matter of months. Many companies now take six to eight months to deliver boats because of high demand. The builders generally handle their own transportation, which requires obtaining special state permits to “wide load” haul the boats over land to the destination lake.

Interestingly, while many customers are continuing to demand larger and more upscale boats causing some companies to vie for

“bragging rights” on who is building the most expensive boats, there seems to also be a retrenchment back to more affordable standardized boats. Sumerset recently launched a new standardized line of boats in the range of \$145,000 to \$155,000. In this line of boats, developed by an outside design firm, customers can choose from narrowly defined options (mostly interiors), but with enough standardization (plans cannot be significantly altered) to keep production costs down. Economic development officials mentioned a new start-up houseboat company being planned in the region that will focus on fully standardized boats as its niche.

Houseboat Cluster Characteristics

As discussed earlier, some clusters are more tightly linked and synergistic than others. The following factors, drawn from the taxonomy described earlier, are indicative of how well the cluster takes advantage of external economies and collective efficiencies.

Social Infrastructure/Networking

The houseboat manufacturers in this region are locally owned, and thus, company owners are very familiar with each other and their operations. Because the companies are in relatively small communities, owners live and

work near one another and secrets are few and far between. While certain owners are on good terms with each other and willing to assist one another (loaning equipment, for example), others are not willing even to be present in the same room with their competitors. The animosity among firms stems primarily from owners of new start-ups who left established companies and, according to the latter, took with them either valuable employees, customer contacts, or both. In one instance, two companies filed lawsuits against each other over an alleged violation of a non-competition clause. The fact that some companies in Wayne County have received federal tax credits and loans because they are located within an Empowerment Zone also upsets other owners who are not eligible for those benefits. Finally, some employers accuse others of employee poaching, contributing to the lack of trust and cooperation.

Recently, the National Marine Manufacturers Association started a houseboat subcommittee to focus the manufacturers on issues of mutual concern. However, several knowledgeable individuals report that the group is struggling to undertake any meaningful activities due in large part to the strained relations among firms.

Competition

As in most clusters, competition among companies is intense, even though at present most of the firms presently are working at full capacity (many have expanded recently, or plan to). While all the companies use essentially the same design, certain companies are known for niche specialties or styles. Thus, firms do not really compete solely on the basis of cost, abating some of the price undercutting potential.

All of the firms interviewed recognize that despite the hostile environment, having so many competitors nearby is actually an advantage. They realize that they benefit when a potential buyer is drawn to the region, and because he or she is “in the neighborhood,” and stops by their factories even though their company may not have originally been at the top of the customer’s list. This is particularly true for newer and smaller companies that do not have the name recognition of established firms like Sumerset or Stardust.

Innovation

The cluster of manufacturers in Kentucky has been at the forefront of innovation in the houseboat industry by building increasingly larger and more luxurious houseboats with a distinctive appearance. According to an industry expert, these high-end boats have attracted some nontraditional boaters to the market because customers can now enjoy amenities previously unavailable on a boat. Recent innovations in houseboats have less to do with performance enhancements and more to do with luxury design. An exception is the addition of thrusters, devices that aid in maneuverability, to large boats built by most of the firms in the cluster. None of the companies interviewed employs any degreed engineers. But they all use Computer-Aided Design (CAD) software to design and modify boats, which does require certain advanced technical competencies.

Owners name their customers as their major sources of innovation because they introduce new concepts into the design of their own boats. Companies also rely on yachting publications and attendance at yacht shows for inspiration and innovation, particularly in design and interiors.

To modernize internal management and enhance technology innovation, Sumerset Houseboats has two high-speed connections to the Internet and a full-time webmaster. Buyers can view daily updated photos on the web showing their houseboat in the production process. Further, computer kiosks located throughout the plant give workers access to every boat’s plans and work orders. Cisco and *Inc.* magazine recognized the company’s IT leadership by naming it runner-up in their 1999 *Growing with Technology* awards program for small and mid-size businesses. Fantasy Yachts introduced a production line innovation by building its plant so that its large boats move down a production line to work stations (welding, framing, finishing, etc.), rather than remaining stationary as is traditional in the industry.

Entrepreneurial Energy

With five start-up companies in the past five years, it is clear the houseboat cluster has entrepreneurial energy. As described, most of the entrepreneurs already lived in the local area and partly owned or worked at existing firms; two were attracted to the region because of its

role as the center of the houseboat industry and the relatively low wages compared to other parts of the country. The cluster's entrepreneurial activity has been strictly focused on the manufacture of houseboats. This research identified only one related business—a fiberglass components company in Somerset that builds slides, wet bars and bridges for houseboats. There is, however, one pontoon boat manufacturer in Wayne County.

Workforce

Manufacturing a houseboat is a very labor-intensive endeavor, and every company interviewed reports that the scarcity of skilled labor is a serious problem facing all members of the cluster. Skills needed by houseboat manufacturers are diverse, but they share much in common with skills required by the construction industry. For example, building a houseboat involves carpenters, electricians, welders, plumbers, fiberglass installers, carpet installers, and painters. The local construction boom (Pulaski County is one of the state's five fastest growing counties) has intensified competition for these skilled workers, which has translated into rising wages and more attractive benefits packages to attract and retain them.

Wages vary according to skill, with carpenters, electricians and welders generally receiving the highest. Entry wages for unskilled workers start between \$6 and \$7 per hour. Skilled workers receive between \$8 and \$10 per hour, and team leaders and supervisors can earn wages from \$13 to \$19 per hour. The region's economic development officials report that such jobs are seen as "good" because pay is above average for the state and the working environment is clean and desirable.

A number of houseboat firms report that most, but not all, of their employees have high school diplomas. Work habits and experience outweigh credentials, and in general, employers reply that they frequently hire individuals based on informal connections and "word of mouth" about an employee's work habits.

Firms interviewed report that they do almost all of their training on the job, and links between the companies and local educational institutions are quite weak. Two firms mentioned that they have hired graduates from two local welding programs, one at an area vocational center in Wayne County that mostly trains high school students, and one at the

technical campus of Somerset Community College (formerly Kentucky Tech in Somerset). The college also has an industrial maintenance program whose graduates, according to college officials, are occasionally hired by houseboat firms. Somerset Community College's continuing education staff has taught computer training and leadership/supervisory skills for a few houseboat firms over the past two years. Bluegrass State Skills Corporation, the Commonwealth's incumbent worker training program, helped pay for some of the training.

Aside from these links, however, there are gaps at the local educational institutions with respect to skills that houseboat manufacturers need. For example, the community college does not have a basic electricity or carpentry program—skills highly needed by firms. One firm expressed a concern that with the merger of the community and vo-tech systems, the technical branch of the college is moving away from traditional trades programs toward "higher tech" training. Another reported gap is the lack of a Computer-Aided Design (CAD) training program in Wayne County, a software skill required for boat design.

No programs at the college are specifically geared toward the needs of the houseboat industry—perhaps not surprising given that the cluster's major growth is relatively recent. One company said that it would like to cross-train its employees in order to even out, and thereby, speed production. It would like for local firms to collaborate with the college on a houseboat manufacturing program that would teach multiple trades from the perspective of the industry. Several firms expressed interest in participating in cooperative or apprenticeship training programs with local high schools as a way to attract and train workers.

Suppliers

One measure of a cluster's intensity is the extent to which firms share common inputs, and their availability within the local region. In this instance, houseboat companies use the same inputs: lumber, aluminum, fiberglass, and finished products such as appliances, windows and engines. With the exception of lumber, most are produced outside of south central Kentucky. Local suppliers that are used by firms are primarily cabinetry and drapery firms. Nearly all other goods are shipped in from outside of the region; for example, it costs between \$500

and \$1,000 to transport the windows used in a typical houseboat, most of which are made by a Hunter Douglas plant in Michigan. Economic development officials are aware of this and marketed the region as a potential site for a new Hunter Douglas plant. An inhibiting factor, however, is that while finished products, like windows, comprise a large portion of the houseboat cluster's inputs, the demand consumes only a small part of the output of large suppliers. Therefore, the cluster may not be large enough to cause a firm to locate a facility in the region.

While a few owners expressed modest interest in joint purchasing among houseboat companies, most did not. One firm owner said, in fact, it would not take part in any joint purchasing because even if he benefited from the arrangement, he would not participate in something that benefits his competitors.

Financing

Firm owners did not raise financing issues as a significant barrier to their businesses. While most companies have capital debt, few have operating debt. Many local firms have expanded in the last few years through loans from local banks. Two Wayne County companies received subsidized loans to build and expand their factories from the region's \$13 million venture capital fund associated with the federal Empowerment Zone. Other start-ups used personal funds or loans from local banks, specifically Monticello Bank and First Southern National bank. Some newer firms had contracts with rental companies that purchase houseboats before they built their plant, enabling them to secure loans. Owners report that the largest barrier to starting a firm is not financing but knowledge of how houseboats are built and gaining the necessary contacts to build a customer base (Lackey, 1998). Nonetheless, the growth of the number of firms implies that these barriers are surmountable.

Access to Specialized Services

Specialized services refers to the existence of private companies and public agencies that offer services (financial, legal, technology assistance, and training) that reflect a strong understanding of the issues and needs of a particular industry. Indeed, in many mature clusters, the agents that provide these services become an integral part of the cluster itself. As important as the houseboat

cluster in south central Kentucky is to its rural economy, it is still relatively small (less than 1,000 employees) and most of its growth is quite recent. As such, there is little evidence of specialized services, with the exception of local banks that have financed new start-ups and company expansions.

With respect to technology and management assistance, a few firms have, at times, used consultants for outside expertise. However, most of the firms interviewed expressed skepticism about their value because they believe they do not understand the industry well enough. Of course, until consultants gain experience working with houseboat companies, this is effectively a self-fulfilling prophecy. A regional representative of the Kentucky Manufacturing Extension Partnership (MEP) has called on most of the houseboat companies and learned that marketing—not technology—assistance was the area in which firms most often express some interest. Nonetheless, the field agent believes that the smaller companies could benefit from assistance with production flow issues to achieve efficiency gains—even though the firms themselves did not recognize this need. To date, no work has been conducted by the MEP for any of the houseboat companies.

In general, there appears to be a need for firms to build their capacities in areas such as organizational development, quality control systems, use of information technologies (both in management systems as well as production) and supervisory training.

Shared Vision/Leadership

The interviews with firm owners did not reveal anything that might be called a "shared or collective vision" for the cluster. Like most small and medium manufacturers, the firms concentrate almost exclusively on getting their product "out the door" as quickly and profitably as possible. Two of the larger companies did express a willingness to take a lead in establishing new joint efforts in areas such as training programs and joint purchasing. However, they also acknowledged that strained relations among many of the firms make such joint endeavors difficult. Economic development agencies in the region, which are paying increasing attention to the houseboat cluster, however, may be willing to take the lead in

fostering the development of a collective vision for the cluster.

Findings and Lessons for other Rural Economies

The concentration of houseboat companies in south central Kentucky is not large in absolute terms but it represents both a commanding presence within its industry and a significant economic force in its region. These firms, many of which are fewer than five years old, exhibit many characteristics and behaviors of a cluster and indeed gain specific advantages because of their geographic location. However, the companies do not address common needs in any kind of concerted fashion and therefore the advantages they garner from being in the cluster are lower than they might be.

The cluster's development primarily stems from locally-driven private sector induced entrepreneurial drive; however, it has also benefited from public assistance, such as the Empowerment Zone subsidized loans that two 1990s start-ups received, and support by a county industrial board for one of the first spin-off companies.

Few specialized services have developed, and although this does not appear to have been a hindrance, it has not provided the advantages it could. There is evidence, for example, that production and management assistance would benefit many companies. The one area that is proving to be a problem is the workforce, where needs for education and training geared to the industry are acute. But it seems likely that the cluster is moving along a development curve and is entering a stage where at least some additional services will soon appear.

Though no doubt beneficial, based on this analysis a strong local supplier base does not appear to be necessary for small-scale and relatively low-volume clusters. The houseboat companies import most of their supplies from outside the region. However, relatively low cost labor and local knowledge of the industry still make the region attractive to start-ups.

Recommendations

During the course of the research, firms, economic developers, educators, and others interviewed largely agreed on many of the challenges facing the houseboat industry generally, and those specifically related to the Kentucky cluster. The research also revealed

opportunities to strengthen the cluster and make progress in resolving current challenges.

Yet, a preface to these challenges and possible responses is necessary. More firms will have to engage in a greater degree of collective action if they want to realize the full benefits of their co-location. In fact, this is often a characteristic of successful clusters: firms recognize that even though they are fierce competitors, there are certain issues on which it is in everyone's best interest to cooperate because together they can achieve common goals that individual firms are unable to cost-effectively achieve alone. This requires a certain amount of trust, which is difficult to develop in any cluster.

The history of the houseboat cluster's development, with acrimonious feelings (and even lawsuits) makes trust even harder to achieve. Significant progress on the challenges and opportunities discussed below is only likely if a neutral party steps forward to gain the confidence of the members and facilitate some level of cooperation. While some firms appear to be genuinely interested in joint endeavors, others currently are disinclined. One possible facilitator is the Center for Rural Development in Somerset, which already has a particular focus on the houseboat industry. It recently received funding from the Appalachian Regional Commission to assess the needs of and develop collaborative strategies in the wood products sector in southeastern Kentucky.

Workforce Issues

When asked, firm owners cited the workforce as their number one problem. Companies report high turnover. In an employee-favorable tight job market, "employees will go across the street to another company for a quarter more an hour," according to one owner. And companies are having a particularly hard time finding CAD technicians, skilled welders, electricians and carpenters, as described earlier. Several firms said they have orders for boats backed up and that they could be building more if the labor market were not "tapped out."

Recommendation: Regional secondary and post-secondary education leaders should hold an open meeting with houseboat company owners to ascertain their specific training needs and explore the feasibility of working with industry to establish new appropriate training programs.

Possible initiatives include establishing cooperative or apprenticeship programs for high

school students; a CAD training program in Wayne County, possibly via distance learning offered at the workplace; and a multi-trade houseboat manufacturing curriculum at Somerset Community College focusing on key trades as well as short courses in safety, quality control, and lean manufacturing principles. The programs could be offered as non-credit skill upgrading programs, as one-year certificates, and, in an expanded version, as a two-year A.S. degree for those aiming for supervisory positions. Evening and distance learning course offerings should be emphasized to enable working students to participate.

Regulatory issues

There are two issues on the regulatory front causing great concern among houseboat owners. First and foremost, the state of Tennessee will not permit boats 18 feet or wider to be “wide load” hauled through the state. This is a serious problem because (1) almost all houseboats are hauled to their destination lake on roads; (2) close to half of the boats currently made in south central Kentucky are 18 feet or wider; and (3) avoiding travel through Tennessee often requires circuitous routing—sometimes adding hundreds of additional miles. Due to the added time and expense of driving around Tennessee, some companies admit to a temptation to ignore restrictions by hauling their trucks through the state and risking substantial fines. While companies have lobbied Tennessee legislators individually, there is no cohesive collective effort to resolve the problem.

The overall quality of roads in the region is another transportation issue. Most of the four county area is without easy access to a four-lane road (there are no interstates), and some firms complain that they need better road access.

Environmental regulations pose other problems. Boat owners are not allowed to dump raw sewage into lakes or rivers, and the Environmental Protection Agency is reportedly cracking down on owners who do so. However, the houseboat industry and owners contend that there are inadequate sewage disposal facilities on most lakes, particularly in Kentucky and Tennessee (many of which are managed by TVA). There is a need for the industry to work with those who manage lakes to make more facilities available in order to avoid driving away potential customers. The need for more and higher quality boat launch ramps in regional

lakes was also mentioned by a couple of houseboat companies as a problem.

Recommendation: Lobbying for more “friendly” legislation is often the first activity in which an industry cluster sees an advantage to cooperation.

The issues obviously have a great impact on firms in south central Kentucky and, given the cluster’s local dominance, it would make sense that it takes the lead. Since the houseboat subcommittee of the National Marine Manufacturers Association has struggled under leadership of a firm owner located in the cluster, a neutral facilitator, as suggested, should use these political issues to bring companies to the same table and then develop ways to represent their interests. This effort could serve to build a foundation upon which to build future initiatives.

Marketing

One important gap that became apparent in talking with firm owners and industry experts is that there is very little marketing data about the houseboat industry. Aside from *Houseboat* magazine and a few boat shows, companies are not proactive in their marketing. None has conducted or contracted for a marketing study, which might better define the demographic market for houseboats and recommend strategies for reaching potential buyers. On the supply side, there are many calm lakes in the United States and Canada where houseboating is not yet popular, partly because lake resorts and marinas do not have sufficient slips, launch ramps and other facilities that can accommodate craft the size of houseboats.

Recommendation: High quality market research is expensive, and it makes economic sense for the industry to undertake a comprehensive market analysis collectively (perhaps including firms outside the Kentucky cluster).

A service provider with an interest in economic development, possibly including TVA, might also be a good candidate to sponsor the research. The analysis should define and quantify the houseboat market and profile the demographics of target customers so that companies have quality information upon which to base proactive marketing campaigns. Another possible step suggested by an industry expert is for firms to collectively sponsor a “Discover Houseboating” marketing campaign that would attract customers from other boating markets.

Further, companies could work together to promote houseboat facilities at lakes without them.

A caveat to this recommendation is that successful marketing to boost demand could inadvertently backfire if companies do not have sufficient production and organizational capacities to meet increased demand. As mentioned, a number of firms in the cluster currently operate with quite basic operational systems. Regional leaders should think about how to encourage more advanced production and management systems in houseboat companies so that firms are more efficient and better able to meet expanding demand. Research shows that firms most often learn from each other and from equipment and service vendors, and thus, public sector involvement might wisely concentrate on increasing forums for exchange among companies and improved access to information about new technologies, both “hard” and “soft.”

Understanding and Applying Clusters to Develop Rural Economies

The purposes of the two case studies presented in this report are to (1) help policy makers better understand the potential and dynamics of clusters in rural contexts and (2) more effectively use the advantages associated with various types of specialization to strengthen rural economies. More specifically, we ask:

Are there benefits that spill over from metropolitan clusters to adjacent nonmetro counties and, if they exist, how can nonmetro counties increase the economic benefits?

Do small clusters in towns and small cities act like larger clusters in more densely populated places and if so, how can nonmetro regions build and expand the economic advantages associated with small scale clusters?

Are local and state economic development agencies aware of the clustering occurring and does it affect their practices?

This report presents two instances in which nonmetro regions benefit from clusters: the auto cluster in Middle Tennessee, where development began in the metropolitan area but in the last decade the majority of new suppliers have chosen fringe nonmetro counties over the metropolitan area; and the houseboat cluster, which has blossomed into an important economic driver in a very rural area despite its relatively small scale.

Since clusters come not only in different sizes but also in different shapes and forms, it is important that rural economic developers and policymakers understand how they function as local production systems and recognize the core elements that give them their identity. The latter is the key to effective policy. Every cluster has some core common element that provides it with its opportunities to achieve external economies and collective efficiencies. The element most often chosen, for ease of identification and analysis, is the product as defined by SIC Codes. But it can also be a common core technology or resource, market, or skill requirement.

The unifying force of the houseboat manufacturers is quite obvious: common products and markets. Members are very competitive with one another yet can clearly benefit from cooperation and certain collective actions because they are all very similar. The cohesive element of the motor vehicle parts cluster, however, is not a product: companies are part of the same supply chain with the same customers that demand special delivery and quality requirements. Therefore member firms are much more diverse in their skill requirements and core competencies, less apt to be in direct competition with one another, and much more difficult to classify. The advantages of collective actions and external economies are less transparent among the companies themselves and to economic development officials.

Despite the different unifying elements of the two clusters, it is useful to examine the same factors that give each of them their special advantages, e.g., specialized services, experienced labor markets, social infrastructure, and innovation, as a framework to think about useful rural development strategies.

Specialized services

One of the reasons that businesses tend to cluster is that scale attracts specialized services that reduce transaction costs. The houseboat cluster could gain from such services, but it still lacks the critical mass of firms necessary to justify significant specialization. While the auto supplier cluster has scale, it represents too wide a set of products to justify the same kind of specialization. But it does need consultants, bankers, accountants, and information technology support services that understand

their common customers' (the auto assembly plants) requirements.

Specialized labor markets

Similarly, labor force needs are more specialized in the houseboat cluster, where industry experience and skills are highly valued and competitive. Motor vehicle parts manufacturers may have very different needs depending on their products, but there is a set of core technical competencies and management skills that relate to the quality and delivery requirements of the cluster.

Social capital

The houseboat industry could be strengthened by higher levels of trust and a more effective social infrastructure that would allow companies to develop a common vision for their industry and more efficiently respond to joint needs. The social capital base of the auto suppliers, whose members often sell to other markets as well, is more connected to companies' production processes and thus, they relate more to their own industry association than to any motor vehicle related alliance. A local social infrastructure, however, might create opportunities for production networks and learning that would open new markets and increase productivity, as demonstrated by the success of supply chain associations in Wales (Hughes, 1997).

Entrepreneurial activity

New business development is a strong force within the houseboat industry, which has grown mainly from within based on a local resource, Lake Cumberland. Motor vehicle parts companies are generally recruited rather than started because it takes considerable time and investment to achieve the performance levels demanded by the motor vehicle OEMs. The cluster is externally driven, based on favorable geography coupled with the development of interstates. Start-up costs are high and experience and relationships are very important in securing contracts. The greatest entrepreneurial opportunities may be for third- or fourth-tier suppliers of standardized parts or for experienced employees who start microenterprises to meet special needs, such as tool and die makers.

Innovation

There is little R&D associated with either cluster although some form of innovation occurs in each. In houseboats, it is primarily in design rather than technology. Among auto suppliers, the common innovations are those connected to distribution or communications, e.g., just-in-time deliveries, e-commerce, or e-business applications.

Thus, while the cluster profiles of the two examples are different, the attributes to analyze them and to shape rural development policy are similar. By using this framework, nonmetro regions can adopt rural development strategies that better identify and support clusters so that their economic benefits are maximized. In this particular research, we learn that external economies of scale are more difficult to achieve in the houseboat cluster because of small scale of activity. Further, in the auto cluster the collective efficiencies are more difficult to achieve because of its greater dispersion. Yet at the same time, we also learn that there are strategies that rural developers should undertake to, for example, address workforce development, support specialized services, and foster social capital to better reap benefits from these clusters in terms of economic growth and jobs.

Endnotes

1. The U.S. Office of Management and Budget defines the Nashville MSA as including the following counties: Cheatham, Davidson, Dickson, Robertson, Rutherford, Sumner, Williamson, and Wilson.
2. Montgomery County, although on Greater Nashville's periphery, is considered to be a metropolitan county, by virtue of its inclusion within the separate Clarksville-Hopkinsville MSA.
3. SIC Code 3714 (*Motor Vehicle Parts and Accessories*) captures much of the activity in motor vehicle supply chains, including largely first-tier manufacturers such as producers of drive trains, body components, and related items. Other associated firms are listed exclusively in other sectors. The most comprehensive documentation is compiled by the State's Department of Economic and Community Development, which publishes a yearly directory entitled *Automotive Suppliers Directory*. This directory provides a basis for further analysis into the region's auto supply industry. In addition, employment data from the Employment Security Commission was obtained for the state of Tennessee. To isolate vehicle suppliers, a list of industries associated with benchmark clusters was used, identifying 40 industries (by SIC code) that have significant inputs into vehicle manufacturing. Some of these industries, such as "Automotive and Apparel Trimmings," have intuitive connections to vehicle production, while many others, like Ophthalmic Goods, Adhesives and Sealants, consist of more second- or third-tier supplier relationships.
4. Interview with editor of *Houseboat* magazine.
5. United States Bureau of the Census.
6. November, 1999. Kentucky Department of Employment Services. The average United States unemployment rate for the same period was 3.8 percent.
7. Kentucky Department of Employment Services.
8. National Marine Manufacturers Association web site and interview with editor of *Houseboat* magazine.

References

- Anderson, Donald and Stephen A. Johnson. 1992. "A Linkage Approach to Industrial Development." *Growth and Change* 23 (Summer): 322-334.
- Asheim, Bjørn T. 1997. Flexible Specialization, Industrial Districts and Small Firms: A Critical Appraisal. In Emste, H. (Ed.) *Regional Development and Contemporary Industrial Response: Extending Flexible Specialization*. London: Belhaven Press.
- Barkeley, David. L. and Mark S. Henry. 1998. "Rural Industrial Development: To Cluster or Not to Cluster?" *Review of Agricultural Economics* 19 (No. 2): 308-325.
- Bishop, Bill. 1997. "Building boats, building wealth." *Lexington Herald-Leader*.
- Fitzgerald, Sharon H. 1998. "Conferences Drive South: Automotive News and SAE Bring Their Annual Meeting to Tennessee." *Journal of Communications*.
- Gibbs, Robert M. and G. Andrew Bernat, Jr. 1997. "Rural Industry Clusters Raise Local Earnings." *Rural Development Perspectives* 12 (No. 3): 18-25.
- Held, James R. 1996. "Clusters as an Economic Development Tool: Beyond the Pitfalls." *Economic Development Quarterly* 10 (No. 3): 249-261.
- Henry, Mark S., David L. Barkley, and Yibin Zhang. 1997. *Industry Clusters in the TVA Region: Do They Affect Development of Rural Areas?* Lexington, KY: TVA Rural Studies Program, University of Kentucky, December.
- Hoyman, Michele M. 1997. *Power Steering: Global Automakers and the Transformation of Rural Communities*. Lawrence, KS: University Press of Kansas.
- Hughes, Gwawr. 1997. "The AIWA Skills Training Partnership and Barry College: Supply Chain Associations in Wales." *Firm Connections* 5 (March/April), Regional Technology Strategies, Inc.
- Klier, Thomas H. 1998. *Geographic Concentration in U.S. Manufacturing: Evidence from the U.S. Auto Supplier Industry*. Chicago: Federal Reserve Bank of Chicago.
- Lackey, Steven Brent. 1998. *Examining the Seedbed Potential Characteristics of Certain Manufacturing Industries: A Case Study of the Houseboat Manufacturing Firms in the Lake Cumberland Region of Kentucky*, Staff Paper 98-7. Lexington, KY: TVA Rural Studies Program, July.
- Lorentzen, Mark (Ed.). 1998. *Specialization and Localized Learning*. Copenhagen: Copenhagen Business School Press, Handelshøjskolen.
- Maillat, Denis. 1995. "Territorial dynamic, innovative milieus and regional policy." *Entrepreneurship & Regional Development* Vol. 7: 157-165.
- Malecki, Edward J. 1993. Competitive Manufacturing in the 1990s: Implications for Rural Communities. In Economic Research Service's, *Rural America and the Changing Structure of Manufacturing: Spatial Implications of New Technology and Organization*, Conference Proceedings. Washington, DC: U.S. Department of Agriculture: 1-33.
- Miller, Karin. 1998. "State Auto Industry Still Speeding Along." *The Daily Net Journal: Auto Scene*. (1-6) September 5.

- Murray, Edward P. 1999. "Cluster-Based Development Strategies: Lessons from the Plastics Industry in North Central Massachusetts." *Economic Development Quarterly* 13 (No. 3): 266-280.
- Porter, Michael P. 1990. *The Competitive Advantage of Nations*. New York: Free Press.
- Rosenfeld, Stuart. 1995. *Overachievers: Business Clusters that Work: Prospects for Regional Development*. Chapel Hill, NC: Regional Technology Strategies, Inc.
- Rosenfeld, Stuart, Edward Bergman, and Sarah Rubin. 1985. *After the Factories*. Research Triangle Park: Southern Growth Policies Board.
- Schmitz, Hubert. 1997. *Collective Efficiency and Increasing Returns*. Working Paper 50. Brighton, UK: University of Sussex, Institute of Development Studies.
- Tennessee Valley Authority. 1997. *Locational Assessment: Motor Vehicles and Equipment (SIC 371)*. Knoxville, TN.
- Waits, Mary Jo and Gail Howard. 1996. "Industry Clusters: A Multipurpose Tool for Economic Development." *Commentary* 20 (No. 3): 5-11.

Appendix

TN/KY Economy/Auto Matrix

<p>Low Economy/High Auto</p> <p>Coffee</p> <p><i>Economy</i> 17th in PC income change 8th in pop. Change 16.1 poverty rate \$19,891 PC income</p> <p><i>auto</i> 14 firms (1st), 1219 (5th) employees</p>	<p>High Economy/High Auto</p> <p>Marshall</p> <p><i>Economy</i> 4th in PC income change 3rd in pop. change 12.9 poverty rate \$20,571 PC income</p> <p><i>auto</i> 10 firms (3rd), 2078 (1st) employees</p>
<p>Low Economy/Low Auto</p> <p>Macon</p> <p><i>Economy</i> 11th in PC income change 11th in pop. Change 19.0 poverty rate \$15,057 PC income</p> <p><i>auto</i> 2 firms (13th), 141 employees (11th)</p>	<p>High Economy/Low-Mod. Auto</p> <p>Logan, KY</p> <p><i>Economy</i> 3rd in PC income change 15th in pop. change need to get poverty rate \$17,652 PC income</p> <p><i>auto</i> 3 firms (9th), 555 (10th) employees</p>

N=17 counties

Data Key

PC Income Change is from 1986-1996

Population Change is from 1990-1996

Poverty Rate is for 1993

Per Capita Income is for 1996

TN Nonmetro '96 median per capita income: \$17,465

KY Nonmetro '96 median per capita income: \$16,475