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Targeted Economic Development in Tennessee: An Industrial Cluster Analysis of a Multi-County Upper-Cumberland Region

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To the Graduate Council:

I am submitting herewith a thesis written by Benjamin Paul Sanders entitled "Targeted Economic Development in Tennessee: An Industrial Cluster Analysis of a Multi-County Upper-Cumberland Region." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

<div align="right">Christopher D. Clark, Major Professor</div>

We have read this thesis and recommend its acceptance:

William M. Park, Daryle E. Ray

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<div align="right">Carolyn R. Hodges</div>

<div align="right">Vice Provost and Dean of the Graduate School</div>

(Original signatures are on file with official student records.)

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William M. Park

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Accepted for the Council:

Anne Mayhew

Vice-Chancellor and
Dean of Graduate Studies

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Targeted Economic Development in Tennessee:
An Industrial Cluster Analysis of a Multi-County Upper-Cumberland Region

A Thesis Presented
For the Master of
Science Degree
The University of Tennessee, Knoxville

Benjamin Paul Sanders
August, 2005

Abstract

The purpose of this study was to identify and rank industrial clusters in a rural, multi-county region in Tennessee. Counties in the study region include Clay, Fentress, Jackson, Overton, Pickett, and Putnam. Industrial clusters were identified at the 3-digit level of the North American Industrial Classification System (NAICS).

Five industrial clusters were identified in this region: *food manufacturing, primary metal manufacturing, fabricated metal manufacturing, transportation equipment manufacturing,* and *truck transportation*.

These clusters were also analyzed for industrial characteristics, including average establishment size, employment growth, industrial multipliers, average worker wages and income, and revenue generated per worker. The differences in these characteristics were standardized and compiled into an equally weighted index.

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Chapter I. Introduction

A. Targeted Economic Development

Targeted economic development is the process of focusing industrial development programs and efforts at specific industries or clusters of industries (Porter). A targeted approach allows communities to focus development efforts (retention, recruitment, expansion, etc.) on specific industries. Providing the same efforts for all or many industries in an area is often too broad to be handled appropriately.

Targeting can provide three basic advantages for an economic development program:

- Identifies specific industry needs and requirements; and
- Allows fewer, but more valuable, development programs; and
- Reduces financial incentives needed for industry recruitment (Barkley 2002).

Simply put, targeted economic development allows communities to use limited resources more efficiently.

B. Targeting Industrial Clusters

One method of targeted economic development is targeting industrial clusters. An industrial cluster is a geographically bounded collection of similar and/or related firms that together create competitive advantages for member firms and the local economy (Porter). Industrial clusters can include firms with horizontal and/or vertical linkages.

Depending on the size of the community or area, there can be several of each type in a geographical region. Horizontally linked firms produce similar products, while vertically linked firms produce different phases of the same product.

Utilizing industrial clusters in targeted economic development can provide a number of benefits over unfocused development efforts, including:

1. Strengthening localization economies, or cost savings, by luring service and input suppliers to the local area;

2. Facilitating industrial reorganization and thus causing firms to better and more efficiently structure themselves;

3. Encouraging networking among firms; and

4. Generating larger local economic impacts (Porter).

The targeting of potential new members for existing area industrial clusters offers the following advantages:

- The presence of an industrial cluster in the area is evidence that the location is attractive to these types of firms;

- Multiplier effects associated with new firms;

- Industrial clusters tend to exhibit strong employment growth over time; and

- Industrial clusters have potential for new firm spin-offs (Porter).

Targeting specific industries for recruitment, retention, or expansion does not necessarily guarantee that the desired gains will be seen. However, industry targeting

does increase the probability that the region will be successful in developing an industrial[1] base that provides characteristics desired by the community.

C. Identifying Industrial Clusters

Simply pointing out the presence of similar firms in a geographical region does little for economic development. For the analysis to be useful for economic development, statistical data should be carefully analyzed to ensure that:

- Clusters contain a sufficient number of employees. A concentration of businesses, yet with very little employment, could technically constitute a cluster. Developing this type of cluster, however, could have negligible effects on the region's economy.

- Clusters contain a sufficient number of firms to indicate that the region enjoys a comparative advantage in the industrial cluster. What constitutes a "sufficient" number of firms will vary depending upon a region's overall size, employment, and current industrial bases.

- Employment and the number of businesses within the cluster are increasing over time. Increasing employment and business indicate a growing importance or realization of a comparative advantage. Opposite trends indicate loss of comparative advantage.

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[1] The term "industrial" often denotes strictly manufacturing or commercial enterprises. For the remainder of this paper, "industrial" shall refer to any business: manufacturing, retail, commercial, or service.

- An important factor in identifying industrial clusters is specialization. A region may appear to have a high number of businesses in a particular industry, but in order to indicate a degree of specialization the region's concentration should be higher than that of either the surrounding area or the rest of the nation.

D. Need for Targeted Economic Development

1. Role of the University

The process of targeted economic development, using industrial clusters, can be broken down into three phases:

1. Research identifying industrial clusters;
2. Development of programs that meet industrial development goals; and
3. Implementation of these programs.

In cities and more populous areas, these steps are often performed in-house. Due to economies of scale, these areas have the financial and personnel resources to perform their own research. Thus, no pun intended, an effective cluster of research and action is demonstrated.

Smaller communities, townships, and especially rural areas often lack the resources of cities. A rural community simply may not have the financial ability, or possibly the expertise, to engage in the research phase of targeted development. This puts the rural communities at a noticeable disadvantage. Lack of appropriate research may lead to ineffective development efforts by community leaders, making it difficult for these communities to promote economic development.

Enter the role of the University. The mission of a land-grant University is to better the lives of citizens across the state. Small communities and rural regions provide excellent opportunities for effective use of University resources. For example, a University can provide the research phase of development as described above. This forms a direct or indirect relationship between the University and a local economy, thus advancing the mission of the land-grant institution while furthering the development of the local economy[2].

2. Multi-County, Upper-Cumberland Region

Some inherent qualities lead an area to be of slow or low economic activity. One noticeable quality that affects economic action is geography and proximity to an urban area (Hite).

Further, areas of need are not necessarily static. Economic cycles, industrial movement, and agricultural trends in rural areas are all factors that influence the need for economic development.

One such area is loosely described as the upper-Cumberland region of Tennessee. This region is bounded by the I-40 Interstate to the south, the Kentucky border to the north, and the plateau elevations to the east and west. Counties within this region include: Macon, Trousdale, Smith, Jackson, Clay, Putnam, Overton, Pickett, Fentress, Cumberland, Morgan, Scott, Campbell, Anderson, Union, Claiborne, Grainger, and

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[2] This assumes that there is no finite number of industries, i.e., and that adding an industry to one community does not necessarily subtract an industry from another community within the state.

Hancock. A map of this region is provided in Figure 1(all tables and figures are located in the Appendix).

In 2000, this area had an average of 7.2 percent unemployment, more then double the Tennessee average of 3.5 percent. In 1999, 18% of people in the upper-Cumberland area were classified as living in poverty as opposed to a Tennessee average of 13.5 percent (US Census Bureau QuickFacts).

Further, tobacco production in this region used to be vigorous. However, between 1999 and 2002, the region's tobacco production decreased approximately 92% (NASS). The decline in tobacco production exacerbated the frail economic status of the region. Given current agricultural trends, tobacco production in this region is unlikely to rebound, and is perhaps more likely to decrease further.

While the upper-Cumberland counties share many characteristics, both geographic and demographic, the land area is too large and diverse for a relevant cluster analysis of the entire region. For example, Cumberland County has a heavily traveled interstate, a large population, several tourism industries, and relatively low unemployment and poverty rates. Clay County, on the other hand, is also in the region but shows twice the unemployment rate of Cumberland County, is geographically isolated, and has few prominent industries.

Thus, this study will focus on a region of five counties: Clay, Fentress, Jackson, Overton, and Pickett. Henceforth, when referring to these counties as a group, the term *Target Region* will be used. The process of selecting these counties as the Target Region is explained in Chapter III: Target Region Selection and Overview.

E. Objectives and Direction of Study

The purpose of this study is to provide information that will be of value in rural economic development in the upper-Cumberland. The underlying objectives are to:

1. Identify the presence of industrial clusters in the Target Region; and

2. Assess the relative attractiveness of these industrial clusters in terms of potential job growth, wages paid, establishment size, revenue per worker, and multiplier effects.

The two study objectives will be pursued through a combination of quantitative and qualitative research methods. Measurable factors such as employment levels, establishment numbers, and growth will be used for cluster identification. These factors will be coupled with intuitive qualities such as similarity of industry sectors and applicability to the Target Region.

Assessing the relative attractiveness of industrial clusters simply means analytically prioritizing the comprehensive benefits of an industry to the Target Region. Identifying an industrial cluster simply points out some degree of comparative advantage. Since different clusters exhibit varying degrees of economic contribution to the community, economic development plans must assess and prioritize which clusters show the greatest benefits.

This study begins with a review of literature pertaining to rural economic development and cluster analysis. Following is a discussion of the selection process and an overview of the Target Region.

Chapter IV presents the methodology and procedures used in data collection. Included in this section are a description of data sources, the equations and calculations used in the analysis, and an explanation of methods used.

The results of the data collection are presented in Chapter V. While quantitative results are generated in tabular format and presented in the appendix, this section explains those results and covers notable and significant findings.

Finally Chapter VI is comprised of three sections: conclusions drawn from results, methodological limitations of this study, and opportunity and need for further research.

Chapter II. Review of Literature

Several aspects comprise the theoretical underpinning of rural economic development through the use of cluster analysis. First is an outline of recent trends and factors affecting rural economic development. Second is a compilation of theories of rural economic development. Third is a review of agglomeration economics and industrial clustering. Last is the use of industrial clusters in rural economic development.

A. Recent Trends and Factors Affecting Rural Economic Development

The rural landscape has changed significantly in recent decades, even recent years. As rural areas change, so does development and strategies of development for rural areas. Freshwater, in *Rural America at the Turn of the Century, One Analyst's Perspective,* and Johnson, in *The Rural Economy in a New Century*, outline key trends and factors affecting rural economic development in recent years

The last one hundred years have ushered in substantial change to rural areas. Once a majority, rural residents are now a minority. Farmers have even become a minority in rural areas. Mines have been opened and closed- creating and eliminating communities. Forests have been harvested and restored. And in some rural regions, a wave of manufacturing has swept in and then largely disappeared. One thing is for certain: rural communities will not return to the way they were (Freshwater, 2000).

Rural areas face change from a variety of sources. Freshwater identifies several of the most notable forces on rural communities:

- Resource depletion;
- Changing government policies;
- Changing markets;
- Technological change;
- Globalization;
- Shift to a service economy;
- Lower transportation costs; and
- Urbanization.

One impediment to rural economic development is, geographically, the uneven distribution of forces and change on rural areas. Freshwater argues that because of this, the federal government has been ineffective in rural economic development. Increasing rural diversity makes it impossible for one or even a set of Federal policies to adequately address the needs of all rural areas (Freshwater, 2000).

Freshwater goes on to claim that state governments have a role in rural development. That role, however, is effectively limited to road construction and improvement, performance standards for school systems, determining hospital locations, and controlling local government revenues and expenditures (Freshwater, 2000).

The limitations of federal and state governments are explored to make the case for local involvement. Freshwater claims that rural policy in the US is coming to grips with the necessity of involving local governments and local leaders in rural development (Freshwater, 2000). Locally based policies allow the use of a variety of state and federal programs that are tailored to a specific rural area. With the role of different levels of government established, Freshwater gives three objectives for success in rural development: build coalitions, gain urban support, and promote sound policies. Rural groups must build a coalition able to advance the rural perspective on a broad range of

issues (Freshwater, 2000). With demographic and geographic variations, even within a specific rural area, rural communities must strive to achieve goals that are mutually beneficial to all those involved.

Urban interests and concerns dominate social, economic, environmental, and political issues. Therefore, those promoting rural development must find a strategy that is acceptable to the urban majority (Freshwater, 2000). Unfortunately, this will not be an easy task for policy makers. Freshwater claims that urban America has become increasingly suspicious of rural decisions and behavior. Urban residents see rural development efforts- such as extracting natural resources or building dams and other infrastructure- as inconsistent with national interests in preserving rural amenities. At the very least, rural areas must address the growing conflict between environmental preservation and development (Freshwater, 2000).

Promotion of sound policy is vital to long-term, viable rural development. Freshwater believes that the future of rural America rests upon its ability- with governmental assistance- to define and develop competitive industries to replace the low-skill manufacturing industries upon which it has depended (Freshwater, 2000).

Freshwater gives a structural framework for understanding the status of rural areas and the general direction necessary for rural economic development. However, Freshwater's work is only a general framework. In his paper, *The Rural Economy in a New Century*, Thomas Johnson expounds even further on the economic status of rural America. Johnson focuses on the current status of rural areas and the incipient forces that will change life in rural areas through the early 21st century.

Johnson first defines urban and rural areas. Urban counties have a core city with at least 50,000 residents and an area population of at least 100,000 residents. Rural counties are all other counties (Johnson, 2001). From a historical economic perspective, urban areas produced products in the early stages of the product cycle. Rural areas generated raw materials, food and energy, and in some regions provided low-cost labor for the production of goods in the mature stage of their product cycle. Hence, rural communities depended on the income and employment generated by farms, and farm families. With that economic paradigm in place, Johnson establishes that economic development strategies for rural areas, while often of limited success, were generally simple, i.e., support agriculture, forestry, and mining and attract manufacturing.

In analyzing specific economic changes, Johnson identifies three forces leading to significant alterations in rural life: technological change, globalization, and localization. Johnson concedes that technology is nothing new to economies dependent on mining, forestry, manufacturing, and agriculture. However, he also asserts that agriculture is the most fundamentally affected sector when new technology is introduced. Technology increases labor productivity, allowing for greater production with lower labor. Consequently, robust production and employment have become decoupled (Johnson, 2001). This can be seen as production increases while employment decreases.

This effect directly impacts rural areas. As those areas are losing some of their comparative advantage in industries that use labor extensively, there are not other rural industries to utilize the excess labor. In essence, increasing labor productivity substitutes capital for labor, thus shifting returns from the labor pool to the owners of physical

capital. In the case of agriculture, this capitalization has resulted in larger farms, shrinking farm population, and most importantly declining labor income.

Johnson claims that the effects of globalization have left many rural communities unsure of their best strategies. Very different spatial features attract employers than in the past. Traditional industrialization incentive programs, when successful, attract employers of a type that can as easily be lured away again by another community with an attractive incentive program (Johnson). While this is a significant factor to bear in mind in recruitment of businesses, it also strengthens the argument that clustering is a valuable tool in economic development. If a business is part of a cluster in a community, it will be less likely to locate somewhere else due to simple cost savings of labor or other inputs.

When localization (the growing role of local conditions and local choices to determine the prosperity of a community) issues arise, Johnson claims the decided disadvantage of rural areas is low population density (Johnson). If population density is low, there are fewer people and entities to assume roles needed in robust localization.

In addition to economic changes in rural areas, Johnson also investigates demographic changes in rural America. For example, Johnson identifies a recent migration to rural communities. This is borne from the desire to live a rural lifestyle without the attached work requirements of a farming lifestyle. This demographic change can have positive economic impacts. An inflow of residents can also bring entrepreneurial talents, new investments, experience, market knowledge, and capital (Johnson).

According to Johnson, governments worldwide are changing the way they look at economic development. Rural communities are no exception. Johnson identifies the trend

of devolution, which refers to the process of shifting policy responsibility from the federal government to state and local governments. Johnson alludes to a new governance system that is performance based, not simply policy based. This is congruent with the above-discussed role of local governments by Freshwater.

Johnson and Freshwater, to varying degrees, aptly illumine the forces and dynamics shaping rural America. A grasp of those factors is necessary, but not sufficient, for developing a complete picture of rural economic development theory. Of course, a truly complete picture would encompass all theories of economic development, as well as all literature remotely pertinent. This study, however, focuses those topics and works directly related to a cluster analysis in the target area.

B. Rural Economic Development Theory

David Barkley's *Employment Generation Strategies for Small Towns: An Overview of Alternatives* lends a full, yet succinct and appropriate, overview of rural economic development strategies. Barkley begins by establishing that the primary goal of most economic development is employment growth. Barkley argues that more jobs mean more residents, more spending at businesses, and more tax revenues. Sustained job growth stimulates improvements in the education and skills of the local labor force, making the community a more attractive location for businesses.

Two popular explanations of community employment change are the Economic Base Theory and the Local Comparative Advantage Theory, as explained by Barkley.

The Economic Base Theory is also known as the Demand Side Approach. This theory proposes that economic activity is divided into "basic" or "export" activities and

"non-basic" or "local" activities. Basic activities bring outside money into a region, whereas local activities serve the establishments and individuals within a region. Basic industries are often large factors of a region's economy, because of the new money and wealth induced into the region. Non-basic industries simply allow money to be exchanged within a region, with little net increase or decrease in wealth. Differentiating these two activity types is important because it allows a better identification of the cause and effect relationships in local economies (Barkley 2002).

The Economic Base Theory also describes the "multiplier effect", which means that each dollar of basic income in a firm actually generates more than one dollar of total community income (Barkley 2002). The multiplier effect is weakened by leakages, when people use excess income for goods purchased outside the local economy. To stimulate local employment growth and development, the Economic Base Theory suggests that efforts should be focused on: 1) increasing export activity, and/or 2) decreasing the proportion of income leaking from the community. Thus, Economic Base Theory is the justification for programs such as industrial recruitment, small business development, tourism development, and expansion of the local service sector (Barkley 2002).

The Local Comparative Advantage Theory is also known as the Supply Side Approach. This theory complements the Economic Base Theory by giving insight into why firms decide to locate in a given community. Looking at the supply side of economic development, economic activity is dependent on the availability of resources for the production of goods and services. Barkley also explains that the comparative advantage theory provides insight into factors contributing to the decline of rural communities.

Barkley suggests that community efforts be based on first determining what the local comparative advantage is and then developing new economic activities that take advantage of that competition edge. Within those broad guidelines, Barkley explains the six basic employment generation strategies popular in non-metropolitan areas:

1. Recruit new basic employers from outside the community, primarily branches of multi-plant manufacturing concerns.

2. Support entrepreneurial activity and the development of new small businesses.

3. Increase income and employment in local agribusiness industries by further processing of local production or the development of new agricultural products for the area.

4. Expand local service and trade activity to reduce leakages of spending outside the community.

5. Develop tourism, recreation, and retirement industries to the extent that significant outside spending can be attracted to the community.

6. Develop programs which aid in the retention and expansion of existing businesses (Barkley 2000 p 5).

One theory of rural economic change is the Income Equalization Model. This model assumes a perfect migration of capital and labor. Labor, being perfectly mobile, will migrate from low-wage areas to high-wage areas while capital flows in the opposite direction. This perfect migration ultimately causes an equalization effect of capital and labor, thus causing an eventual convergence of incomes among regions (Galston and Baehler). The Income Equalization Model appears to have been of significance in the past. However the assumption of equalized income has been shown empirically to be unrealistic and that the utilization of this model has decreased (Galston and Baehler).

A number of studies have indicated that such mobility increases, rather than decreases, regional disparities, because migrants generally comprise a higher percentage of individuals with education and desire for economic improvement; those left behind may be unsuited for a wide range of economic activities or may be out of the workforce altogether (Galston and Baehler).

Another theory of rural economic change is the Unbalanced Growth Model. This model shows that growth occurs more rapidly in some areas than in others. Supposedly, growth at a core area spreads growth to peripheral areas by increasing demand for goods and services in the outlying areas. These outlying areas are typically rural areas.

However, Unbalanced Growth Models are considered ineffective in economic development planning because:

- Demand for rural products does not rise proportionally to income;

- Rural competition will often depend on technology; and

- Urban areas cannot guarantee demand to rural areas as opposed to global demand (Galston and Baehler).

Building on Unbalanced Growth Models is Central Place Theory, which explains the relationship between a city (urban area) and surrounding region (rural area). Central Place Theory establishes that for a rural area to develop, it must be part of an urban area. Following Central Place Theory, there are three ways in which a rural area might become part of a city region:

1. Infrastructure improvements might make city areas more accessible to rural areas.

2. Rural communities might be able to "federate" in ways that replicate key aspects of urban areas.

3. Rural communities might generate their own growth poles (Galston and Baehler).

Directly pertinent to this study are Location Models that focus on distance and the costs of overcoming it. Location is vital to firms in several ways. First, is the cost of transporting of goods, both inputs and outputs. Access to markets, in addition to access to inputs, is also important. Firms desire amenities of certain areas, and there is an increasing degree of emphasis on external economies of location. Thus, Location Models claim that locational outcomes are a function of several factors: available resources, production techniques, immobility of factors of production, agglomeration economies, and individual locational preferences (Galston and Baehler).

C. Agglomeration Economies and Industrial Clusters

Location theory also includes the concept of agglomeration economies. This study focuses on industrial clusters, which benefit from agglomeration economies.

Agglomeration economies depend upon regional comparative advantage- the advantages a firm enjoys by locating to one region instead of another. Regional comparative advantage, in turn, depends on the relative importance of primary factor resources, i.e., land, labor, and capital, to an industry. Different factor resource endowments and productivities lead to relative factor scarcities. Thus, when resources are more plentiful, a regional comparative advantage arises for industries that heavily utilize

those resources (Shaffer, Deller, and Marcoullier). The initial endowment and underlying

productivity of factor resources, combined with the availability of these resources and the

knowledge of their use, lead to competitive opportunities for firms and increased

specialization of regional output (Shaffer, Deller, and Marcoullier).

Two other aspects of agglomeration economies are pecuniary externalities and

localization effects. Pecuniary externalities are positive interactions that arise due to firms

locating in close proximity to one another. Pecuniary externalities can manifest in cost

minimization and/or demand maximization(Shaffer, Deller, and Marcoullier).

Cost minimization is primarily tied to input suppliers. If similar firms are

clustered, input suppliers have an incentive to also locate nearby. Readily available inputs

and services can present cost savings to a firms. Similarly, demand can increase due to

clustering of firms. Customers and purchasers are more likely to visit an area with a

variety of similar firms and products. In such a case, the competition arising from

clustered firms actually increases demand for the entire cluster. Localization effects are

simply location decisions of firms to regionally agglomerate to maximize pecuniary

externalities (Shaffer, Deller, and Marcoullier).

Further, internal economies of scale relate to localization effects in agglomeration

economics. Firms can influence the location of linked firms, such as input suppliers. If

one firm significantly benefits from economies of scale, input suppliers will tend to be

drawn toward the larger firm.

In the article *The Thunen Model and the New Economic Geography as a*

Paradigm for Rural Development Policy, Hite offers a slightly different perspective on

the significance of agglomeration economies. Hite states that, "economic sectors with

few economies of scale can find a niche in remote areas. Thus, because of scale economy

problems and positive transport costs, remote areas with sparse populations cannot

support an economy of many sectors and will be more specialized than economies of less

remote and urban areas" (Hite p 234). With this, Hite is simply saying that specialization

is seen in rural economies because cannot support the needs and demands of a diversified

economy.

Hite attempts to define exactly what the term "rural" means. He does this by

utilizing the Thunen model and the New Economic Geography (NEG). Hite basically

defines rural as simply not urban. The more non-urban a location is, the more remote, and

hence the more rural.

The Thunen model begins with a simple model of one urban center and its rural

hinterland. Hence, a paradigm emerges in which rurality in its most essential sense, is

synonymous with Thunen remoteness- measurable along some vector of economic

distance (Hite 1997). From this model, Hite observes three characteristics of rural

economies:

1. Low population density;

2. Specialized; and

3. Economically conservative.

According to Hite, the NEG does not supercede the Thunen model, but it does

offer new insights and explanations. The NEG is a refinement of the Thunen model in

which a central urban city is not assumed, but emerges if transport costs are low,

economies of scale are substantial, and the inputs for at least one sector are perfectly

mobile.

Moving from economic theory to practicality, Hite offers several developmental policy implications.

1. If labor is relatively immobile, some industries might be attracted to rural places; hence, the prospect of cheap labor might logically attract employers in industries in which economies of scale are modest.

2. If there are increasing returns in the form of pecuniary externalities, beneficiaries will include landowners and the local business community. Hence, these beneficiaries might maximize their net worth by assuming some extra tax burden to finance incentives for new industries.

3. Incentives to new investors need not be in perpetuity if a critical mass of some industry is attracted to a location, and remoteness is consequently reduced (Hite pp 237).

Agglomeration economics, localization effects, and specialization all feed into what is now known as industrial clustering. Industrial clustering is not a new concept. In fact, clustering could probably be traced back as far as the beginning of non-agrarian trade. The notable point, however, is that only in recent times has industrial clustering been given attention as a policy tool for rural economic development. Instead of simply acknowledging industrial clusters, economists are now acknowledging the benefit and usefulness of clustering.

The definitive work on clustering is Michael Porter's *Clusters and the New Economics of Competition.* Porter first defines clusters as a" critical mass- in one place- of unusual competitive success in particular fields." Or, put another way, clusters are geographic concentrations of interconnected companies and institutions in a particular field (Porter p 78).

Porter identifies a number of large and well known clusters:

- Dalton, GA- carpets

- High Point, NC- furniture
- Hollywood, CA- entertainment
- Nashville, TN- hospital and health care management
- Wichita, KS- farm equipment
- Carlsbad, CA- golf equipment
- Silicon Valley, CA- microelectronics

Porter asserts that what happens inside a firm is important to that firm's success, but clusters reveal that the immediate business environment outside companies plays a vital role as well. The greatest benefit, according to Porter, is that clusters promote both competition and cooperation. The competition aspect is vital for a thriving cluster-vigorous competition causes a cluster to ultimately succeed.

From a cooperation standpoint, the proximity of companies and institutions in one location fosters better coordination and trust. Thus, clusters mitigate the problems inherent in arm's length relationships without imposing the inflexibilities of vertical integration or the challenges of creating and maintaining formal linkages such as networks, alliances, and partnerships. A cluster of independent and informally linked companies represents a robust organizational form that offers advantages in efficiency, effectiveness, and flexibility (Porter).

Porter gives several explanations of how clusters foster healthy competition. Porter claims that modern competition depends on productivity, not simply access to inputs or scale of an enterprise. In essence, productivity rests on how companies compete. According to Porter, there are three broad ways that clusters affect competition: increasing productivity, driving innovation, and stimulating new business formation. A cluster enhances these factors, as opposed to distantly placed competition, because it

allows each member to benefit as if it had greater scale or as if it had formally joined

other companies (Porter pp 80).

Several aspects of clusters are given that encourage stronger company

productivity:

- Better access to employees and suppliers;
- Access to specialized information;
- Complementarities and horizontal linkages;
- Access to institutions and public goods; and
- Motivation and measurement through local rivalry.

On this last point, Porter makes a very pragmatic observation. Peer pressure, pride, and

the desire to look good in the community motivate firms to outdo one another.

In addition to enhancing productivity, clusters play a significant role in a

company's ongoing ability to innovate. Some of the same characteristics that enhance

current productivity have an even more dramatic effect on innovation. A cluster provides

capacity and flexibility to act rapidly and allows companies to experiment at lower cost.

Further, the competition that occurs in a cluster encourages constant innovation.

Clusters also highly enhance potential for new business. A cluster signals

opportunity, and it is no surprise that many new companies begin within a cluster as

opposed to an isolated environment. Further, individuals can easily perceive gaps in

vertical or horizontal linkages. These gaps are, in actuality, an opportunity waiting for

business formation. Within a cluster, barriers to entry are often lower than elsewhere

because local financing can be at a lower premium for capital. Finally, entrepreneurs can

benefit from established relationships (Porter).

The possibility of new business formation is extremely important to this study and

this Target Region. When industrial clusters are used as a development tool, the

possibility and potential for new businesses can be vital for a developing economy. Further, at the intersection of clusters, insights and skills from various fields merge, sparking even new businesses.

According to Porter, understanding clusters gives economic planners four basic items for an agenda:

1. Choosing locations;

2. Engaging locally;

3. Upgrading clusters; and

4. Working collectively.

Porter differentiates between traditional industrial recruiting and the use of clusters as a development tool. While past governmental policy has been to simply attract business, Porter claims that macroeconomic policy is necessary, but not sufficient. It is the firm level, or in this case cluster level, microeconomic policy that will ultimately determine competitiveness and productivity. Governments then, have three new roles to play: ensure a supply of inputs (infrastructure, labor, etc), set rules of competition so that productivity and innovation will govern success in the economy, and promote cluster formation and upgrading (Porter).

Porter also asserts that governments should work on build and reinforce existing and emerging clusters as opposed to creating new ones, on the theory that successful business will grow from established and growing clusters (Porter).

D. Industrial Clusters in Rural Economic Development

Thus far, the basic rural economy has been explored, as have been the theories behind industrial clusters. Combining these two theoretical considerations illustrate the practicality of utilizing industrial clusters for rural economic development.

A concise work in this specific area can be seen in Eric Scorsone's *Industrial clusters: Enhancing rural economies through business linkages*. Scorsone begins by exploring past rural development policies. He then states, "During the past decade, business and industrial clusters have emerged as critical forces in economic development strategic planning. As communities begin exploring this development option, questions arise concerning how these clusters benefit businesses and communities" (Scorsone p 3).

To address the questions of applicability of clusters to rural economic development, Scorsone explores four areas: benefits to businesses, benefits to communities, types of clusters, and how to promote clusters.

Scorsone identifies four benefits to rural and community businesses that arise from industrial clusters.

1. *Localization Economies*. This benefit arises when firms using similar specialized inputs are located near one another, thus increasing the demand for, and availability of, those inputs.

2. *Labor Pooling*. This occurs when firms compete for the same type of occupations and workers, drawing qualified employees to the region for multiple employment opportunities.

3. *Access to Information and Benchmark Standards*. Firms in close proximity can more closely monitor and gauge performance of both potential customers and suppliers.

4. *Complementary Products*. Due to proximity, the product of one firm may have an important influence over the activities of other firms. Further,

complementary businesses may choose to engage in joint marketing that
will benefit each by expanding the overall market demand (Scorsone p 3).

A cluster's benefits and advantages should not be strictly limited to firm-level benefits. Therefore, for a community to pursue cluster development strategies, there must be benefits specific to that community- the residents, the workforce, and the economy.

According to Scorsone, one benefit to communities is that clustered groups tend to have higher productivity and higher wages for employees. Another benefit is that employment and income spillovers from clustered businesses may be greater than other forms of economic development. As new businesses develop, they demand more inputs. These needs are then met through greater expenditures in the local economy (Scorsone).

Scorsone goes on to define two basic types of clusters seen in rural economies. The first is the value chain. In essence, this means businesses that buy and sell from each other. An excellent example of this is seen in Silicon Valley's computer industry. Many of the components in computer and electronics are also produced in the area, thus creating both horizontal and vertical value chains.

The second type of cluster is the labor pool. These clusters are based on occupational categories, allowing firms who use similar types of occupations and worker skills to draw from a larger pool of potential employees. An example of this is Nashville's hospital management cluster. That cluster relies more on the expertise and experience of the local labor pool than on natural comparative advantages.

Scorsone establishes that in order to promote clusters, a community must first identify potential clusters in the region. The community must then decide if the support infrastructure is in place to fully complement the value of a cluster. Cluster identification

and information can then be used to argue the case for targeted infrastructure investments (Scorsone).

In "Industry clusters in the TVA Region: Do They Affect Development of Rural Areas?" Barkley, Henry, and Zhang claim that support for industrial clusters is widespread, and that there are many case studies of the evolution of industrial clusters and their impacts on local economic development. Benefits of industrial clusters are believed to improved the productivity and growth prospects of cluster firms, and thus regions successful at attracting industrial clusters are expected to realize greater income and employment growth than areas following a less focused approached to industrial development.

Barkley, Henry, and Zhang explore the actual effects of industrial clusters on rural counties in the TVA region. They analyze the effect of industrial clusters on rural income from 1981-1994 in regions having established industrial clusters. They do this by testing for statistical significance in variables used to reflect cluster attributes, labor availability and quality, local market conditions, quality of life, public expenditures and taxation levels, and urbanization economies.

They find that clustered industries had larger income gains than non-clustered industries in areas that experienced growth. In declining areas, however, clustered industries had larger income decreases than non-clustered industries (Barkley, Henry, and Zhang). Barkley, Henry, and Zhang suggest then that industrial clustering may be a risky economic development strategy since clusters can be associated with more volatility in local income change than with a diversified approach.

Another study focusing on industrial clusters in rural areas is "Clusters in Rural Areas: Auto Supply Chains in Tennessee and Houseboat Manufacturers in Kentucky" by Forman, Kingslow, Liston, and Rosenfeld. This study addresses instances where clusters appear to be present, and addresses the characteristics and power of rural clusters, by examining the auto industry around Nashville, Tennessee and the houseboat industry around Somerset, Kentucky.

One finding of this study is that little is really known about the actual business transactions along supply chains within the Middle Tennessee region. Nonetheless, several important issues arose. One is the labor shortage in the form of "soft" skilled labor. "Soft" skills include communications, problem solving skills, and teamwork (Forman, Kingslow, Liston, and Rosenfeld).

Another finding is that low costs found in rural areas (land and labor) are no longer sufficient, although still a consideration, for attracting companies. Also important is logistical access. The authors assert that interstates seem to matter to new companies looking for a site. This can be, at least partially, credited for the growth of the auto industry in middle Tennessee, which is crisscrossed by three major interstates (I-24, I-40, and I-65) (Forman, Kingslow, Liston, and Rosenfeld).

In analyzing the houseboat industry in Kentucky, the authors find that few specialized services- generally assumed to be a characteristic of industrial clusters- have developed. Interestingly, this lack of specialized services does not seem to be a serious hindrance in the development of this industry cluster.

One application of targeted rural economic development is the Plains Economic Targeting System (PETS). This system is presented in the essay *Improved Prospects for*

Rural Development: An Industrial Targeting System for the Great Plains. In the PETS

system, a series of econometric equations are used that match industry input and market

requirements with community characteristics to generate a probability of new business

location over a given time period. Further, the coefficients generated for a given county

are transformed into marginal impact, providing important information relating to local

policies that can improve the probability of attracting a given industry (Leatherman,

Howard, and Kastens).

In *Using a Targeted Industry Analysis in a "Comprehensive" Economic*

Development Extension Program, James Nelson presents six components necessary in an

economic development plan using industrial targeting. Beyond identification of clusters,

these components are necessary for effective development efforts, and are as follows:

1. General information about community and area economies;

2. Information about how economic development comes about;

3. A planning process to help community leaders understand the strengths and
   weaknesses of their communities, and to help them develop community visions;

4. Ideas and tools to address community service and infrastructure deficiencies in
   communities;

5. Ideas and tools directed toward the use of industry targeting to accomplish
   community goals and objectives; and

6. Ideas and tools directed toward helping entrepreneurs and business managers
   make good decisions about strengthening and expanding existing business
   operations, and establishing new firms.

Nelson asserts that, at minimum, the conceptual framework of industry targeting

contributes greatly to the rationale of community economic development. Simply

knowing, according to Nelson, about the imports and exports of existing local firms

provides a solid basis for an important set of local economic scenarios (Nelson).

Another application of cluster analysis as an economic development tool is David

Barkley's *Targeting Growth Opportunities for Lancaster County, 2002*. In that study, a

cluster analysis was performed for Lancaster County, South Carolina. Barkley not only

identified current and emerging clusters in Lancaster County, but also gave an overview

of those industries and the characteristics they exhibited to the community. Clusters were

identified that had characteristics such as a significant presence in the county and

promising employment generation potential (Barkley 2002).

This study intends to utilize this same approach, which will heretofore be referred

to as the Clemson Method. A primary rationale for this choice is that the Clemson

Method targets a regional economy within a state, as opposed to state-wide or multi-state

regions. Further, given data availability and economic development intent, the Clemson

Method offers a streamlined method of attaining the objectives for this study.

Chapter III. Target Region Selection and Overview

A. Target Region Selection

The first step in this study is to identify a specific Target Region within the Upper Cumberland region. The aim is to locate a multi-county region with similar economic, demographic, and geographic characteristics. Ideally, this will then cause a cluster analysis to be 1) accurate, and 2) equally applicable to all counties within the target area.

It was hoped that a small, multi-county region within the Upper Cumberland would emerge naturally. Visually examining a map of the Upper Cumberland primarily brought out a region consisting of Jackson, Clay, Overton, Pickett, and Fentress counties. See Figure 2 for a map of these counties and the broader upper-Cumberland region. While a valid first step in region identification, visual examination could also border on arbitrary selection. Therefore, subjective identification should coincide with applicable and measurable quantitative and qualitative criteria.

With this purpose, three broad selection criteria and seven sub-categories were established. These criteria include both quantitative and qualitative aspects, and were applied to the region at a county level. These criteria were developed to ensure a similar and comparable target area, as well as an area of need for economic stimulation. Criteria were established subjectively and intuitively, and then were structured with objective measurements and thresholds. The selection criteria are:

1. *Geographic Similarities*

    a. There should no interstate traversing the county. Interstates and nearby areas can skew employment and population numbers. Further, an interstate in one target county could vary numbers significantly from other target counties.

    b. Included counties should border at least one other target county.

    c. To ensure a reasonable target size, included counties should not be separated by more than two other target counties.

2. *Demographic Similarities and Thresholds*

    a. A county should have no metro areas, as established by the US Census Bureau. This study focuses on rural development. To ensure accuracy then, only rural (non-metro) counties are included.

    b. The percentage of people living in poverty should exceed the Tennessee average of 13.5 percent.

    c. Persons per square mile (population density) should not deviate by more than fifty percent between counties.

3. *Economic Threshold*

    a. Unemployment rates should be at least seven percent, double the Tennessee average of 3.5 percent.

Applying the above criteria objectively confirmed the multi-county area (clay, Fentress, Jackson, Overton, and Pickett) mentioned above.

These counties all adhere to the geographic criteria: all are non-metro areas, there are no interstates, no counties are isolated, and the greatest distance between two counties is less than two counties. Further, this area also adheres to the demographic and economic criteria. This information is summarized below.

	Unemployment (%)	Poverty (%)	Population Density (persons/sq. mi.)
Jackson	7.7	18.1	35.6
Overton	6.9	16	46.4
Fentress	7.6	23.1	33.3
Clay	12.6	19.1	33.8
Pickett	10.1	15.6	30.4

US Census Bureau, 2000

There is, however, one discrepancy. Pickett has a relatively low population density, thus raising the deviation above 50% between Pickett and Overton (an actual difference of 52%). However, this difference is quite negligible. The purpose of that criterion is to identify counties of similarity. A deviation discrepancy of two percent is, in this case, quantitatively trivial.

Several other counties met the unemployment and poverty rate criteria thresholds. None of these counties, however, met the geographic similarity criteria and were thus eliminated. The complete Target Region then is: Jackson, Clay, Overton, Pickett, and Fentress counties.

B. Overview of Target Region

In 2000, the Target Region had an average unemployment rate of 8.98% and an average poverty rate of 18.38% (US Census Bureau QuickFacts). In addition to being a good sample (due to similarities), this area is clearly in need of economic development. If a study is intended to result in action, then areas of need should be identified. This specific Target Region certainly adheres to that mentality.

The current industrial base will be very influential in a region's ability to expand given current or impending national economic trends. If an industry is declining on a national level, chances are slim for increasing that industry on a local level- even if a region has strong labor pooling and comparative advantage for that industry.

The current industrial base also illuminates such characteristics as the labor pool (occupational skills, availability, wage structure, etc.), specialized services, and the presence of supportive institutions (technological schools, public agencies, etc.) Intuitively, areas with desirable current industrial conditions such as skilled labor, supportive services, and modern infrastructure will more easily attract firms and business than areas of more limited conditions.

Needless to say then, a vital and integral part of rural economic development strategy is a comprehensive understanding of the current and recent economic conditions and industrial base. With this in mind, that Target Region was analyzed for trends in total employment, employment distribution, educational attainment, occupational and educational characteristics, and commuting patterns.

1. Trends in Total Employment

Table 1 presents total employment trends for the Target Region between 1997 and 2003. Also included are comparison regions (Tennessee and the United States) from 1997-2003. Between those years, the Target Region realized a total employment decrease from 13,591 to 12,717, or -6.43% of the 1997 total. Over the same time period total employment for the state of Tennessee increased by 3.01%, from 2,522,860 to 2,598,748. Total employment for the United States increased even more, moving from 121,044,432 in 1997 to 127,795,827 in 2003, an increase of 5.57%.

A striking employment feature of the target region can be seen in unemployment rates. As shown in Table 2, the Target Region consistently exceeds state and national unemployment rates. In 1997, the Target Region unemployment was 11.56%, compared to 5.4% for Tennessee and 4.9% for the entire US. This is 214% of the state unemployment rate, and 235% of the US rate. In 2003, the regional unemployment rate of 8.49% compares to 5.50% for Tennessee and 6.00% for the US. In 2003, unemployment for the Target Region is 154% higher than the Tennessee rate, and 142% higher than the US unemployment rate.

Between 1997 and 2003, the Target Region experienced a 25% increase in nominal per capita income from $16,086 to $20,119. This is compared to a 28% increase for the state of Tennessee, and 22% for the US. Nonetheless, the Target Region still lags state and national averages. In 2003, the Target Region per capita income is 73% of the Tennessee level ($27,611) and only 65% of the national level ($30,906). Per capita income for the target region, Tennessee, and the US are shown in Table 3.

2. Employment by Major Industry Divisions

Employment levels for the Target Region, Tennessee, and the United States are given in Table 4. The Bureau of Labor Statistics divides employment into major industry divisions referred to as SuperSectors. Employment in the Target Region is concentrated in three areas. Manufacturing commands the highest concentration at 32.37% of employment, followed by trade, transportation, and utilities at 22.70% and education and health services at 17.35%. Employment in the Target Region is disproportionately concentrated in manufacturing with respect to the levels seen in Tennessee (18.63%) and the US (13.51%). Instead, the largest concentration of Tennessee and US employment is in trade, transportation, and utilities at 26.09% and 23.39%, respectively. The only noteworthy difference other than manufacturing can be seen in professional and business services. Tennessee and the US are relatively similar in employment concentrations (13.05% and 14.81% respectively). The target region, however, is considerably lower with 3.48% of jobs in professional and business services. The Target Region's high share of manufacturing, coupled with the appreciably low level of business and professional services, may dampen business and industrial growth opportunities.

Table 5 shows employment trends between 2001 and 2003 by industry SuperSector. For this time period, Tennessee and the US both experience a decline in total employment, but more notably a decline in employment for over half of the industry SuperSectors. Further, gains in industrial sectors are relatively low. The largest gains in Tennessee and the US are seen in education and health services (8.82% and 5.98%, respectively). The Target Region, however, experiences an increase in employment in all but two industrial SuperSectors. The only employment losses are seen in natural

resources and mining (1% loss) and manufacturing (9.11% loss). Most gains in the Target Region are modest. Employment in the information sector, however, increases 44%, while leisure and hospitality employment increases 13.19%.

3. Occupational and Educational Characteristics of the Target Region

For potential industry establishment, the quality of the labor pool is a strong determinant. Intuitively, enhancing or increasing employment and productivity is dependent on the type and quality of labor available. Therefore, occupational and educational characteristics play a vital role in economic development.

Educational achievement for the Target Region, Tennessee, and the US can be seen in Table 6. The Target Region shows significant lags in educational achievement. Within the Target Region, less than 9% of the population have a bachelor's degree or higher. Further, a full 38% only have a high school degree, and over 23 have not advanced higher than the 9th grade. The lack of educational achievement in the Target Region glares in comparison to Tennessee, in which 75% of the population has completed high school, and almost 20% obtained a college degree.

The Target Region has the highest occupational concentration in production, transportation, and material moving occupations. The percentage of the Target Region's employed population in this occupational sector is 31.95%, disproportionately high considering the 19.92% average for Tennessee and 14.62% for the US. In contrast, both Tennessee and the US have the highest occupation concentration in management, professional, and related occupations (29.46% and 33.65%, respectively). This compares

to 20.05% in the Target Region. Complete occupational distribution for the Target Region, Tennessee, and the US can be seen in Table 7.

4. Commuting Within the Target Region and Nearby Urban Areas

Integral to any community or region is worker commuting patterns. Employment can flow in or out of a region, and the difference between the two can have drastic effects on the local economy. In some areas, a tremendous portion of the population commute to other areas, thus creating a residential community with little real economy. Regions such as this are generally classified as suburbs of larger economies. Other areas can draw in employees. Large manufacturing plants, cities, and other concentrations of employment can have a robust economy in large part from workers commuting in from outlying areas.

The two most populated counties in proximity to the Target Region are Cumberland County and Putnam County. Both of these counties are traversed by an interstate, and both of these counties border the Target Region. In 2004, Putnam and Cumberland had populations of 65,963 and 50,084 respectively (US Census Bureau QuickFacts).

While there is negligible commuting (less than five percent for any given county) between counties within the Target Region, a full 22 percent of workers travel from the target region to Putnam County. In contrast, only 3 percent commute from the Target Region to Cumberland County (US Census Bureau Worker Flow Files, 2000). Because of the sizable proportion of commuters to Putnam County, the economy of Putnam County will be analyzed in addition to the Target Region.

Chapter IV. Procedures and Methodology

The fundamental objective of this study is to identify industries with significant

presence in the Target Region and with potential to attract more firms to the Target Area.

Factors used in identifying industries include concentration, specialization, employment

levels, and number of establishments. This methodology utilizes the NAICS (explained in

the subsequent sections), subjective analysis, and personal interviews.

A. Industrial Classification Systems

In 1997, the US Census Bureau discontinued use of the Standard Industrial Code

(SIC). The SIC system used 4-digit classifications for industries. The North American

Industrial Classification System (NAICS) was put into use in 1997. The NAICS uses a

six digit system, with each digit indicating an industry of greater specificity. In 2002, an

updated NAICS replaced the 1997 NAICS system.

Comparing the SIC and NAICS systems is complex:

> *There is no direct correspondence between the SIC and*
> *NAICS system. Even sectors with similar sounding names,*
> *such as Electronic Computers, are not comparable. The*
> *reason is that the recoding took place at the establishment*
> *level. That is, companies that made up a particular SIC*
> *code, such as Electronic Computers, were not necessarily*
> *assigned the NAICS code Electronic Computers. It*
> *depended on what they were actually producing given the*
> *new way to look at industry structure (IMPLAN 2000).*

For these reasons, it is difficult to reconcile SIC and NAICS data. Along with the

change in classification systems comes a delay in availability of information. The US

Census Bureau performs an economic census every five years, the most recent being in 2002. The 2002 census, however, has yet to be released in its entirety. For this reason, the 1997 Economic Census is the most recent complete economic census available.

B. Preliminary Data Gathering

1. Source

The source for all industrial, employment, and establishment data used in this analysis is the US Census Bureau's County Business Patterns (CBP). Partly because of this, the time period for observation was selected to be between 1998 and 2002. This time period reflects several rationales. CBP in NAICS form are only available between those years. It is possible to trace patterns before 1998, but the data is in SIC form. As stated above, there is no direct correlation between NAICS and SIC data. Utilizing the period of 1998 to 2002 through the CBP ensures a consistency of information. Further, 2002 is recent enough to reflect pertinent economic changes.

Industrial information was analyzed at the county level. CBP provides economic data on two-digit industrial sectors, as well as up to six-digit industrial sectors. CBP does not give specific employment numbers for all industries. In several cases, a range of employment numbers is given (i.e., 0-19). In these instances, the midpoint value was chosen as the employment figure for that industry.

2. 3-Digit Industrial Sectoring Data

Initially, industries were analyzed at the three-digit level using the CBP for 2002. Employment and establishment numbers were recorded for three-digit sectors that

showed any activity at the county level. Data for each county was compiled, then aggregated into a spreadsheet for the entire Target Region.

Total employment was then calculated. This was performed by simply summing the employment numbers for all three-digit sectors in the Target Region. To maintain consistency, total employment was calculated using the midpoint method. Further, total establishments were also calculated for the Target Region.

Using total employment for the Target Region, a percentage of total employment was calculated for each three-digit industrial sector. This gives a relative proportion of size for each sector compared to total employment.

Employment numbers for US industrial sectors were also gathered from the CBP. Three-digit sectors present in the Target Region were referenced to the corresponding three-digit sector for US employment. For US employment, CBP always provides detailed statistics, so midpoint calculations were not necessary.

Total US employment was also gathered from the CBP. A percentage of total US employment was calculated for each three-digit code of US employment corresponding to the three-digit codes present in the Target Region.

3. Location Quotient Data and Calculations

The next step for preliminary data gathering was to calculate the location quotient. A location quotient (LQ) indicates specialization of an industry sector relative to the nation as a whole. The location quotient is calculated as follows:

$$LQ = \frac{\dfrac{Area\ Industrial\ Employment\ in\ Year\ t}{Area\ Total\ Employment\ in\ Year\ t}}{\dfrac{US\ Industrial\ Employment\ in\ Year\ t}{US\ Total\ Employment\ in\ Year\ t}} \qquad (1)$$

A LQ of one means the ratio of a sector's employment to total employment within the Target Region is exactly congruent to the ratio of US employment for that sector compared to total US employment.

Specialization implies that that region has been, over time, relatively successful in attracting or nurturing employment in a specific industry. Statistically, any LQ that exceeds one can signify specialization of an industry sector. However, simply using this LQ threshold (greater than one) will bring out the even the slightest industrial sector specializations. For cluster identification, only those industrial sectors of notable specialization should be analyzed. Since there is no standard of what constitutes a "notable specialization", a threshold of 1.5 was chosen to follow Barkley (2002). Thus, a high LQ (1.5 or greater) implies the region has a competitive advantage in maintaining and attracting employment in that industrial sector.

This data was then organized into a single spreadsheet. The spreadsheet contains columns for each three-digit industrial sector within the Target Region: establishments, employment, percentage of total employment, US employment, US employment as a percentage of aggregate US employment, and location quotient. This entire process was repeated, in identical form, for 1998. These two spreadsheets, 1998 and 2002, were then compiled into a single spreadsheet to illustrate trends and change in establishments, employment, and location quotient.

This spreadsheet compiles all three-digit sectors present in the Target Region in either 1998, 2002, or both. For each three-digit industry sector, the establishments, employment, and location quotients are shown for 1998 and 2002. If a sector is only present in 1998 or 2002, the other corresponding year is left blank, but the present year is shown. The percent change was calculated using the following formula:

$$Percntage\ Change = \left(\frac{2002\ total\ -\ 1998\ total}{1998\ total} \right) * 100 \qquad (2)$$

Percentages are shown as either positive or negative change, and are rounded to two decimal places. This percent change is calculated separately for establishments, employment, and location quotient for each three-digit industrial sector.

This entire process- 1998, 2002, and trend calculations- was repeated for Putnam County. The only difference is that the Target Region is a compilation of individual county data, whereas Putnam is simply the data for that single county.

C. Screening Procedure

The Clemson Method, the model for this study, utilizes four screening criteria to identify clusters with desired characteristics. These criteria involve establishment numbers, employment, employment trends (increasing employment), and location quotients. Some of these factors were, seemingly, arbitrary. For example, the Clemson Method sets the employment threshold at approximately 2% of total employment. Thus, this study uses roughly 2% of total employment, rounded to the nearest 100, as a

threshold. Increasing employment is a factor that simply indicates a growing industry within an area, and establishment numbers are set, at least for this study, low in order to not exclude potential clusters with high employment but few establishments.

Although factors for identification of clusters are fairly standard- irrespective of whether a region is highly rural or exceptionally urban. Selection tools must be meshed with numerical values congruent with a region's economy to ensure results. However, actual numerical values for a region must be determined from the local economy and demographic information. The following characteristics, and their appropriate value relative to the Target Region, are listed below.

1. Total employment in 1998 is 11,910.

2. Total employment in 2002 is 10,341.

3. Total number of business establishments is 884 in 2002.

Thus, the percentages used in setting the numerical values in the Clemson Method are applied to these values to determine the numerical values to be used in the "screens" for this analysis.

D. Quantitative Screening Criteria

1. Target Region

For the Target Region, the following screening criteria were used:

I.   There must be at least 2 establishments in a 3-digit NAICS sector in 2002.

II. There must be at least 200 employees in a 3-digit NAICS sector in 2002.

III. Employment must have increased between 1998 and 2002.

IV. The industry must be specialized based on a Location Quotient of 1.5 or higher.

Utilizing criteria 1, 2, and 3 identifies industries that have a strong and growing presence in the Target Region. The location quotient criterion identifies industries which exhibit a competitive advantage in the Target Region.

Following application of the screening criteria, seven three-digit sectors were left. Information for these sectors was then gathered, also from the CBP, at the six-digit NAICS code level. Employment, employment as a percentage of total employment, establishments, US totals, and location quotient were all calculated at the six-digit level. This data was gathered at the county level and aggregated into a single source for the Target Region. Again, the CBP had several industries which exhibited employment as a range. In these cases, the midpoint calculation was used.

2. Putnam

The data collection process for Putnam County is identical to that of the Target Region. Using the CBP, data was gathered at the three-digit NAICS code level. Establishments, employment, percent of total, US employment, and location quotient was collected and calculated. Any three-digit sectors showing activity in 1998, 2002, or both was recorded.

Since Putnam exhibits roughly twice the total employment of the Target Region, the screening criteria thresholds were set higher for Putnam. The establishment threshold was doubled, and the employment threshold was increased to 400.

Following the data collection, the following screening criteria were applied:

I.   There must be at least 4 establishments in a 3-digit NAICS sector in 2002.

II.   There must be at least 500 employees in a 3-digit NAICS sector in 2002.

III. The industry must be specialized based on a Location Quotient of 1.5 or higher.

V.   Employment must have increased between 1998 and 2002.

Information for these sectors was then gathered, also from the CBP, at the six-digit NAICS code level. Employment, employment as a percentage of total employment, establishments, US totals, and location quotient were all calculated at the six-digit level. This data was gathered at the county level and aggregated into a single source for the Target Region. In these cases, the midpoint calculation was used.

E. Qualitative Screening Criteria

1. Retail Activity

As opposed to the quantitative screening criteria, the six-digit sectors were then analyzed qualitatively. Several sectors were eliminated with this method. First off were retail activities in the form of groceries, convenience centers, etc. Retail industries present a significant economic presence in some areas. However, retail activities are dependent on the local population, without attracting outside money into the local economy, and thus were not considered a viable source of economic development.

This is not to say that retail activities cannot constitute a cluster. Actually, significant clustering can be seen in retail activities. Many cities have a "motor mile", a restaurant district, or a mall. These are nothing more than retail clusters within that city. Nationally prominent retail clusters include Rodeo Drive, 5th Avenue, and Pigeon Forge.

However, the difference is that a retail cluster generally deals in luxuries or non-consumable items. The retail activities within the Target Region can be classified as supply and consumable item businesses.

High concentrations of retail activity could also indicate leakage from other regions. In this case, the Target Region could potentially draw retail customers from Putnam County, for example, who would bring outside money into the local economy. Increasing local revenue from leakage from other geographical areas is a viable form of economic development. Another related form is offering enough venues to keep residents from "leaking" outside the community for their purchases. Nonetheless, these forms of development represent a separate approach to economic development and are therefore considered to be outside the scope of this study.

2. Firm and Product Similarity

For a cluster to be effective, and not simply a collection of relatively comparable firms, some similarities must exist between the firms. Similarities can include:

- Vertical linkages;

- Horizontal linkages;

- Flow of goods;

- Labor pools and skill sets;

- Necessary collaboration between firms; and/or

- Similarity of products.

If industry clusters do not contain at least several of these similarities, that cluster will also be eliminated. This is a subjective decision. Some industries produce great

similarities, even at the 2- or 3-digit code level. Others still lack similarities down to the 5- and 6-digit level. Thus, the identified industries were also judged on the extent to which these similarities appeared to be present.

The most common factor that can differentiate firms is the degree of similarity of their output. All firms use basic inputs, such as labor, capital, and land, etc. Further, many firms also share a similarity of inputs and services such as technology, computer services, copy machines, business services, etc. Past those basic similarities, however, inputs are often dictated by the end product. For example, a tire manufacturing firm would use a specific type of rubber as raw material. Another rubber manufacturing firm could use completely different types of specific inputs. Therefore, for a cluster to realize benefits from localization economies, inputs between firms must be similar enough to attract suppliers of those inputs.

Additionally, demand maximization of industrial clusters is heavily dependent on product similarity. Purchasers, whether retail or commercial, are attracted to industrial clusters because are seeking choices and variety of one similar type of product. Purchasers for the Dalton, GA carpet cluster, for example, may seek different styles and varieties, but only within carpet products. Therefore, for a cluster to realize demand maximization, products must be similar enough to attract buyers for that product.

F. 6-Digit NAICS Level

With these sectors analyzed at the six-digit level, data was gathered from 1998-2002 to determine trends. Also collected was data on US employment for those six-digit sectors for 1998 and 2002. A single spreadsheet with numbers for establishments,

employment, and US employment was generated. Also calculated was the percent change in these values from 1998 to 2002.

G. Combination of Target Region and Putnam

Up to this point, the Target Region and Putnam have been analyzed independently. However, several rationales give credence to combining the two areas into one region.

As stated in the introduction, there is a significant portion of employee flow from the Target Region to Putnam. A full 22 percent of workers commute to Putnam from the Target Region. With this level of commuting, defining two distinct study areas becomes questionable. There is an obvious ease of transportation between Putnam and the Target Region.

Another reason to combine the two areas is a theoretical need to combine urban and rural areas for effective economic development. Jane Jacobs claims that all self-sustaining economic growth occurs in cities and their regions- that is, in those counties typically categorized as "metro-adjacent" (Hite). Hite, drawing on the Central Place Theory, suggests that rural areas cannot develop economically unless they somehow become a regional urban area.

This theoretical standpoint is clearly manifested in the relationship between the Target Region and Putnam. It is very probable that the economic success of the Target Region will be dependent on the economic climate of Putnam.

Data obtained thus far (employment, establishment numbers, trends, etc.) are separate: the Target Region and Putnam. For the reasons described above, the set of

identified clusters will include those from both Putnam County and the Target Region
and will be referred to as Selected Clusters.

H. Firm Level Information

The next step for the Selected Clusters was to get the actual firm information.
Using the 2003 Harris Directory of Tennessee Manufacturers, the Target Cluster firms
were identified. Data collected includes: company name, year established, phone number,
employment number, location, and SIC code.

Interestingly enough, the Harris Directory still uses the SIC coding system.
Therefore, referencing these firms was impossible using the corresponding NAICS codes.
The method used to identify these firms was subjective, and certainly leaves room for
error. Each Target Cluster was analyzed at the NAICS six-digit level for goods produced.
The Harris Directory also lists firms by goods produced, so firms were manually
identified by referencing the actual products of the firm. While a reasonable method, this
potentially leaves room for a mismatch of firm and industry. Realistically though, the
possibility of a mismatch is low because Selected Clusters are identified at the 3-digit
NAICS code level, which allows a wide variety goods produced within the same
industry.

Information on the *truck transportation* industry was not available through the
Harris Directory. Therefore, that firm-level information for *truck transportation* was
obtained through the internet database for the Yellow Pages. The Yellow Pages does not
list industries by SIC, nor provide employment information. For this reason, the *truck
transportation* information does not cover employment nor SIC codes.

I. Characteristics of Selected Clusters

Characteristics of Selected Clusters are used to measure and prioritize the relative benefits of industrial clusters within the Target Region. For this study, five characteristics- calculated at the 3-digit NAICS code level- are used: employment growth rate, average worker wages and income, industry multipliers, average establishment size, and revenue per worker.

1. Employment Growth Rate

Employment growth rate is calculated on a national scale. Employment growth rate measures the national trends of industries, thus allowing a relative measure of the potential long-term success of regional clusters. Employment growth rate is calculated for the change between 1998 and 2002, and is recorded as the change relative to the 1998 US employment level.

2. Average Worker Wages and Income

Average worker wages and income is the national average for an entire 3-digit industry. This information comes directly from the Bureau of Labor Statistics. Wages are average hourly wages, and income is annual income per employee.

3. Industry Multipliers

        The income multiplier provides the change in total regional income associated with each dollar change in income generated by the new firm. The income multiplier is calculated as follows:

$$Income\ Multiplier = \frac{Direct + Indirect + Induced\ Income}{Direct\ Income} \tag{3}$$

        Direct income is the income earned by employees of the new firm plus local rent, interest, and profits paid by the new firm; indirect income is the amount of income generated by local businesses supplying input to the new firm; and induced income is the sum of local income generated in all subsequent rounds of spending income induced by local spending by employees of the new firm and its suppliers plus the additional spending by new employees of local merchants catering to these individuals. The sum of *direct, indirect,* and *induced effects* equal the *Total Effect*. The total effect is an estimate of all the new income created in the region as a result of the initial change in final demand sales by the firm. The total effects assumes sufficient time has passed for all the rounds of spending to occur.

        All multipliers- direct, indirect, induced, and total effects were generated using IMPLAN 2000. One caveat to bear in mind is that IMPLAN still utilizes the SIC classification system. Therefore, models were run on IMPLAN using the SIC codes obtained in the firm-level information from the Harris Directory of Manufacturing. Also for this reason, *truck transportation* is not assigned a multiplier because there is no

corresponding SIC code nor does IMPLAN provide information on transportation

services.

4. Average Establishment Size

Data for average establishment size comes from the 1997 US Economic Census. The 2002 US Economic Census would be more recent and timely, but much of the 2002 data has yet to be released. Average establishment size is calculated on a national basis. Average establishment size is calculated by simply dividing the number of employees for a 3-digit industry by the number of establishments.

5. Revenue per Worker

Revenue per worker is calculated by dividing the total revenue (sales, receipts, shipments, etc.) by the total number of employees. This characteristic is calculated on a national basis, and the data comes from the 1997 US Economic Census.

A reasonable assumption for these characteristics is that higher values are always better. In other words, a higher wage rate is always preferred to a lower wage rate. Likewise, a larger average establishment size is preferred to a lower establishment size. Despite this assumption, some characteristics should be examined so development efforts would correlate with regional characteristics. For example, an area with a relatively low-skilled labor pool might not be able to attract a high wage industry. More discussion of this, and its pertinence to this study, is included in Chapter VI: Conclusions.

These specific industry characteristics were chosen because of their inclusion and use in the Clemson Method. The exception is in revenue per worker. The Clemson Method uses fixed assets per worker to ascertain fiscal implications. That information, in this case, is not accessible. Therefore, revenue per worker, which seems likely to be positively correlated with fixed assets per worker, was used instead.

J. Index of Characteristics

While it is possible to rank industries according to each characteristic, comparisons among industries on the basis of these characteristics is complicated because one industry might "rank" high on one characteristic and "rank" low on another characteristic. For example, one industry might have a high growth rate, but pay relatively low wages. Regional differences might also contribute to differences in preferred rankings. For example, one county may want to simply attract the highest paying industry while another might be more concerned with industry multipliers.

While some benefit can be gained from an ordinal ranking of each characteristic, the difference between ordinal rankings is constant, while the actual differences are not. Thus, an ordinal ranking also discards potentially useful information. Therefore, an index based on standardized values is used to rank industry characteristics. The index is estimated as follows:

1. The differences in the national averages for industry characteristics are standardized. That is, the five values for each characteristic are treated as observations from a standard normal distribution and a standard deviation for each characteristic is calculated. Standardization of characteristic data permits reliable comparisons across characteristics that have different measures.

2. The actual value for the characteristic is replaced by its corresponding standardized value, i.e., the value as a percentage of standard deviation either above (+) or below (-) the mean. Standardized values near 0 reflect actual values near the average for the five industries. Negative standardized values reflect below average actual values, while positive standardized values represent above average actual values. The larger the standardized value (+ or -) the further above or below the characteristic mean.

3. The standardized values for the five industry characteristics are summed for each industry. Each of the characteristics is given equal weight in this summation.

One point to note is that NAICS 484, truck transportation, was assigned a standardized value of 0.0 (the mean of the industries) because no multiplier estimate could be obtained. Also, standardized values for worker wages and income were calculated from wages only, not annual income. The Clemson Method uses only wage rate for calculations and rankings, so this study follows suit.

K. Personal Interviews

The statistics-gathering methodology, as described above, is vital in identifying industrial clusters. Information in raw statistical data, however, lacks a grasp of current trends and economic prowess of industries. Qualitative data should be supplied to round out an accurate and complete industrial analysis.

The most reliable and accurate source of this qualitative data is often a knowledgeable person in the local area. Experts are employed by most cities and towns to keep a handle on local business, and these experts are expected to keep abreast of the most accurate and recent trends in local business.

To identify experts in the Target Region, the Upper Cumberland Development District (UCDD) was contacted. Henry Bowman, Economic Development Specialist for the UCDD was the contact person. After several conversations, Mr. Bowman provided references in each of the five counties for the Target Region as well as Putnam County. Mr. Bowman indicated that the following contact persons in each county would provide the most complete information:

- *Clay*: Randal Gilman, Executive Director, Chamber of Commerce

- *Fentress*: Scott Sandman, Executive Director, Chamber of Commerce

- *Jackson*: Charlie Hix, County Mayor

- *Overton*: John Roberts, Executive Director, Chamber of Commerce

- *Pickett*: Deseret Peterson, Executive Director, Chamber of Commerce

- *Putnam*: Elleen Duncan, Chamber of Commerce

For each person, the following questions were asked, pertaining to specific business/industry within that county:

1. How many people are currently employed, and what is the economic trend?

2. What specialized resources does the community offer these firms, and are these resources limited?

3. Are there any linkages to other industries?

4. In there any collaboration between businesses?

5. In there any strategy for recruitment of business?

Chapter V. Results

A. Target Region

<u>1. Industry Statistics: 1998</u>

A list of all 3-digit industrial code sectors operating in the Target Region in 1998 is provided in Table 8. In 1998, sixty-four 3-digit industries are present. Combined, the industries in the Target Region in 1998 have a total employment of 11,969 employees and 857 establishments.

Employment varies widely within these industries. The lowest employment number exhibited is 9.5 employees. Bear in mind, however, that this figure is obviously a result of the range of numbers given in the CBP. When a range is given, the midpoint number is chosen. In this case, 9.5 employees would be the midpoint of the range given for those industries. In reality, the employee number could be as low as one or as high as 19. There are nine 3-digit industries that have an employment of 9.5. These are NAICS codes 213, 313, 322, 325, 451, 481, 485, 523, and 611. Combined, these industries have a total of 13 establishments

On the other end of the spectrum, the highest employment for a 3-digit industry is 1,573.5 employees. Again, being a partial number, this employment is clearly reflective of a range given by CBP for employment. Only one industry exhibits employment this high, NAICS code 315, apparel manufacturing. Fourteen establishments within the Target Region fall under this code.

The Location Quotient results also demonstrate a wide range. The lowest LQ seen within the Target Region in 1998 is .04. This LQ is from NAICS code 611, Educational

Services. This LQ means that proportionally, the Target Region has 96% less educational service employment than does the United States as a whole. Code 611 has employment of 9.5 and one establishment in 1998 within the Target Region.

The highest LQ is seen in NAICS code 315, apparel manufacturing. This industry exhibits a LQ of 21.28. This LQ means, proportional to the US, the Target Region has a high concentration of apparel manufacturing employment. For this industry, fourteen establishments are present in 1998 with an employment of 1,573.5.

2. Industry Statistics: 2002

A list of all 3-digit industrial code sectors operating in the Target Region in 2002 is provided in Table 9. In 2002, sixty-five 3-digit industries are present. Combined, the industries in the Target Industry in 2002 have a total employment of 10,341employees and 884 establishments.

Employment varies widely within these industries. The lowest employment number exhibited is 9.5 employees. There are nine 3-digit industries that have an employment of 9.5. These are NAICS codes numbers 322, 323, 325, 485, 488, 514, 523, 611, and 712. Combined, these industries have a total of 10 establishments

On the other end of the spectrum, the highest employment for a 3-digit industry is 923.5 employees. Only one industry exhibits employment this high, NAICS code 336, transportation equipment manufacturing. Six establishments within the Target Region fall under this code.

The lowest LQ seen within the Target Region in 2002 is .04. This LQ is from NAICS code 611, Educational Services. Code 611 has an employment of 9.5 and 1

establishment in 2002 within the Target Region. The highest LQ is seen in NAICS code 321, wood product manufacturing. This industry exhibits an LQ of 12.94. For this industry, 20 establishments are present in 2002 with an employment of 434.

3. Industry Trends: 1998-2002

Target Region trends in employment, establishments, and LQ between 1998 and 2002 are compiled in Table 10. These trends are listed by 3-digit NAICS code number.

The Target Region had 64 3-digit industries in 1998 and 65 in 2002. As can be seen in Table 11, this does not reflect simply adding an industry. Of those 65 industries seen in 2002, 60 were present in both 1998 and 2002. For example, NAICS code 212 is not present in 1998, but has four establishments by 2002. Code 311, on the other hand, has two establishments in 1998 but none in 2002. Other industries not present in 1998 but operating in 2002 include codes 314, 488, 513, and 712. Industries that operated in 1998 but had no presence in 2002 also include industrial codes 334, and 481. Overall, the Target Region experienced a 1.5% increase in establishments between 1998 and 2002. Of the 60 3-digit industries present in both 1998 and 2002, 25 increased in employment. Of those same 60 industries, 11 exhibited no change in employment, and 24 lost employment.

Target Region total employment stands at 11,969 in 1998 and 10,341 in 2002. This represents an employment loss of 13.6%. The greatest employment loss was in NAICS code 315, apparel manufacturing. In 1998, apparel manufacturing employed 1,573.5 people and had 14 establishments. In 2002, only 88.5 employees and four

establishments represented industry code 315. This reflects a 94.38% loss in employment and 71.43% loss in establishments.

The greatest percentage gain in employment is seen in industry code 551, management of companies and enterprises. Industry 551 realized an employment gain of 336.73%, increasing from 49 employees in 1998 to 214 in 2002.

The trends in LQ vary considerably between 1998 and 2002, from an 87.1% decrease to 385.24% increase. The greatest decrease, 87.1%, is seen in industry code 315, apparel manufacturing. Industry code 315 decreased employment from 1573.5 in 1998 to 88.5 in 2002. The greatest gain in LQ, of 385.24% is seen in the NAICS industrial code 551, management of companies and enterprises.

B. Putnam County

1. Industry Statistics: 1998

A list of all 3-digit industrial code sectors operating in Putnam in 1998 is provided in Table 11. In 1998, 72 3-digit industries are present. Combined, the industries in Putnam in 1998 have a total employment of 26,920 employees and 1,163 establishments.

Employment varies widely within these industries. The lowest employment number is 2 employees for industry code 493, warehousing and storage. This industry has 4 establishments in 1998. Conversely, the highest employment for a 3-digit industry is seen at 2,326 employees, for code 722, food services and drinking places. Within this industry, there are 118 establishments.

The lowest LQ seen within Putnam in 1998 is .04. This LQ is from NAICS code 711, performing arts, special sports, and related industries. Code 711 has an employment

of 3 and 3 establishments in 1998 within Putnam. The highest LQ is provided by NAICS

code 315, apparel manufacturing. This industry exhibits an LQ of 5.33. For this industry,

6 establishments are present in 1998 with an employment of 770.

2. Industry Statistics: 2002

Table 12 provides a list of all 69 3-digit NAICS code industries present in Putnam

in 2002. Combined, the industries in Putnam in 2002 had a total employment of 26,266

employees and 1,680 establishments.

Employment varies widely within these industries. The lowest employment

number exhibited is 5 employees. One industry shows this employment: industry code

711, performing arts, spectator sports, and related industries. This industry had 4

establishments in 2002. Conversely, the highest employment for a 3-digit industry is seen

at 2,481 employees. The industry with this level of employment is code 722, food

services and drinking places. Within this industry, there are 108 establishments. The

highest LQ is seen in NAICS code 722, apparel manufacturing. This industry exhibits an

LQ of 9.45. For this industry, 109 establishments are present in 2002 with an

employment of 2,481.

3. Industry Trends: 1998-2002

Trends in employment, establishments, and LQ in Putnam between 1998 and

2002 are compiled in Table 13. These trends are listed by 3-digit NAICS code number.

Putnam has 72 3-digit industries in 1998 and 69 in 2002. Of those 72 industries

seen in 1998, 69 were present in both 1998 and 2002. Industries present in 1998 but not

in 2002 are NAICS codes 213, 324, and 481. These industries were lost, while no new 3-digit coded industries were added to Putnam between 1998 and 2002.

Of the 69 3-digit industries present in both 1998 and 2002, 33 increased in employment, 12 exhibited no change in employment, and 24 lost employment.

Putnam total employment stands at 26,920.5 in 1998 and 26,266.5 in 2002. This drop represents a total employment loss of 2.43%. The greatest percentage of employment loss was in NAICS code 315, apparel manufacturing. In 1998, apparel manufacturing employed 770 people and had 6 establishments. In 2002, only 39.5 employees and 1 establishment represented industry code 315. This reflects a loss in employment equal to 94.87% and loss in establishments equal to 83.3%.

The greatest percentage gain in employment is seen in industry code 493, warehousing and storage. Industry 493 realized an employment gain of 375%, increasing from 2 employees in 1998 to 9.5 in 2002.

The trends in LQ vary considerably between 1998 and 2002, from a 90.95% decrease to 1,463.28% increase. The greatest decrease, 90.95%, is seen in industry code 315, apparel manufacturing. Industry code 315 decreased employment from 770 in 1998 to 39.5 in 2002. The greatest gain in LQ, of 1,463.28% is seen in the NAICS industrial code 314, textile product mills. Industry code 314 saw an employment increase from 9.5 in 1998 to 39.5 in 2002.

C. Quantitative Screening Criteria

<u>1. Target Region</u>

The following screening criteria were used to identify industries that represented clusters, as described in Chapter IV, Procedures and Methodology:

I.   There must be at least 2 establishments in a 3-digit NAICS sector in 2002.

II.   There must be at least 200 employees in a 3-digit NAICS sector in 2002.

III. The industry must be specialized based on a Location Quotient of 1.5 or higher.

IV. Employment must have increased between 1998 and 2002.

Seven 3-digit industries in the Target Region met all four of the screening criteria. Those are NAICS codes 331, 336, 339, 326, 623, 444, and 445. These industries have a combined employment of 3,549.5 and 88 establishments. Information, for 2002, for establishments, employment, and LQ data for these seven industries is provided in Table 14.

Of these industries, the highest LQ is 8.33 in code 331, primary metal manufacturing. The lowest, 1.94, is 445, food and beverage stores. Employment is highest in code 336, transportation equipment manufacturing, while 445, food and beverage stores, has the highest number of establishments.

These seven industries are also broken down into 6-digit NAICS codes. This drill-down is presented in Table 15. Six-digit NAICS coding is the most specific level of industrial classification. Of the seven 3-digit codes following screening criteria application, 22 6-digit industries are present.

The highest employment of these industries is seen in code 445110, grocery stores. Employment for this industry stands at 498 employees in 2002 with 24 establishments. The LQ for industry 445110 is 2.27.

The highest LQ for these industries is 162.79 in industry 331316, aluminum protruded metal product manufacturing. Industry 331316 has an employment of 374.5 and one establishment in the Target Region in 2002.

2. Putnam

For Putnam, the following screening criteria were used to identify industries that represented clusters:

I.   There must be at least 4 establishments in a 3-digit NAICS sector in 2002.

II.   There must be at least 500 employees in a 3-digit NAICS sector in 2002.

III. The industry must be specialized based on a Location Quotient of 1.5 or higher.

IV.   Employment must have increased between 1998 and 2002.

Strict application of the screening criteria applied to Putnam left four 3-digit industries. Those are NAICS codes 484, 311, 333, and 452. The 74 establishments in these industries had a combined employment of 5,604. Establishment, employment, and LQ data for these four industries is provided in Table 16.

Of these industries, the highest LQ is 5.61 for code 484, truck transportation. The lowest is 1.57 for code 452, general merchandise stores. Employment is highest in codes

484 and 311, truck transportation and food manufacturing, respectively. The highest number of establishments is seen in industry 484, truck transportation.

These four industries are also broken down into 6-digit NAICS codes. This drill-down is presented in Table 17. Of the four 3-digit codes following screening criteria application, 27 6-digit industries are present.

The highest employment of these industries is seen in code 311612, poultry processing. Employment for this industry stands at 1,749.5 employees in 2002 with 1 establishment. The LQ for industry 311612 is 31.48.

The highest LQ for these industries is 96.53 in industry 333312, office machinery manufacturing. Industry 333312 has employed 374.5 people and had one establishment in Putnam in 2002.

D. Qualitative Screening Criteria

Two qualitative screening criteria, retail activity and product similarity, were discussed in the previous chapter. Industries were eliminated if they involved primarily retail activities or if there was a lack of comparable products. These qualitative screening criteria were established to ensure a cluster can benefit from localization economies and demand maximization.

Eliminated in the Target Region due to retail activity were two 3-digit industries-444, building materials and garden center, and 445, food and beverage stores. Industry 326, plastics and rubber products manufacturing, was eliminated because products were not comparable as products ranged from tires to foam products to other plastics. Also eliminated was industry 339, miscellaneous manufacturing, as products ranged from

games and toys to gaskets to miscellaneous manufacturing. Also eliminated is NAICS

623, nursing and residential care facilities. While technically not a retail activity, this

sector is non-basic and thus eliminated for similar reasons.

After elimination of these, the Target Region had two 3-digit industries left: 331

and 336. These industries are broken down into six 6-digit industries. This drill-down is

shown in Table 18. Also in Table 18 are number of establishments, and US employment

trends for these industries between 1998 and 2002.

The same qualitative criteria were applied to the Putnam County clusters. Industry

452, general merchandise stores, was eliminated due to retail activity. After examining

the 6-digit industries in Putnam County, 3-digit code 333, machinery manufacturing, was

eliminated for lack of similarity in goods produced. Products in industry 333 included

farm machinery, office equipment, heating equipment, actuator manufacturing, and

general purpose machinery manufacturing.

For Putnam, two 3-digit coded industries were left: 311 and 484. These industries

are also broken down into 6-digit industries. These industries and trends between 1998

and 2002 are shown in Table 19.

E. Special Cases: NAICS 332 and 336

In reviewing the results from the screening process of Putnam County, two

special cases arose. These were sectors 332, fabricated metal manufacturing, and 336,

transportation equipment manufacturing. These sectors were eliminated through the

screening process because of employment loss between 1998 and 2002. However, both

exhibited significant presence in both establishments and employment in Putnam County.

<u>1. NAICS 332</u>

For industry code 332, the employment loss is relatively low- a decrease of only 2.34% between 1998 and 2002. Further, LQ actually increases during those same years by 19.44%, from 1.99 in 1998 to 2.37 in 2002. A simultaneous employment decrease and LQ increase implies that employment in NAICS 332 is decreasing faster nationally than in Putnam County. Further, this also implies that Putnam County is gaining in comparative advantage, as evidenced by the increasing LQ.

Allowing NAICS 332 as a special case prompted a closer examination of the screening results. A second analysis was performed to identify other potential exceptions. Screening criteria were administered again, but with an employment trend threshold of a ten percent decrease between 1998 and 2002. Altering the employment trend criterion, while maintaining the other criteria, can identify industries that have still have significant presence and specialization in Putnam County, but for reasons as described in NAICS 332 might exhibit a slight employment decrease. While ten percent is an arbitrary choice, it seems a rational threshold with which to identify "slight" employment decreases.

The results of this analysis revealed no further exceptions in Putnam County. Those industries with less than a ten percent employment decrease did not adhere to the other criteria. This procedure was also repeated for the Target Region. Again, results did not change.

2. NAICS 336

Industrial code 336 is a reasonable exception because it has already been identified as a cluster in the Target Region. Further, despite an employment loss in Putnam of 36.12% between 1998 and 2002, this industry still represented 4.89% of total employment in Putnam County in 2002. Giving further evidence, for a combined area of Putnam County and the Target Region, NAICS 336 would have an increasing LQ, going from 4.01 in 1998 to 4.29 in 2002. Thus, after quantitative and qualitative selection, Selected Clusters include NAICS codes 311, food manufacturing, 331, primary metal manufacturing, 332, fabricated metal manufacturing, 336, transportation equipment manufacturing, and 484, truck transportation.

F. Individual Firm Level Data

At this point, firm-level information for the Selected Clusters was gathered. Firms, product, SIC code, location, and employment as of 2003 are listed in Tables 20-24. Table 20 shows information on truck transportation, NAICS code 484. Originally, this sector was identified in Putnam County only. However, when firm-level information was researched, several other firms were located within the Target Region as well. Table 21 gives information on individual firms for industrial code 336, transportation equipment manufacturing, for both Putnam County and the Target Region. Food manufacturing, NAICS code 311, is given in Table 22. This cluster is exclusively in Putnam County. Table 23 gives information for NAICS code 332, fabricated metal manufacturing. Table 24 shows information for the only cluster solely in the Target Region, NAICS 331, primary metal manufacturing.

G. Characteristics of Selected Clusters

The five 3-digit industry clusters identified in Putnam and the Target Region are good prospects for industrial recruitment since the area appears to provide a comparative advantage for these industry sectors. However, all clusters might not be equally attractive prospects based on the expected economic and fiscal impacts. Insights into the potential local-level impacts are provided by examining employment growth rates, worker wages, multiplier effects, average establishment size, and revenue per worker. Selected Cluster characteristics are provided in Tables 25-29. For each characteristic, Selected Clusters are ranked highest to lowest.

1. Employment Growth Rate

Establishments in industries with rapid employment growth are more likely to expand and create new jobs more rapidly than establishments in slow growth or declining industries (Barkley 2002). The 1998 to 2002 national employment growth rates of the five selected industries are provided in Table 25. Among these industries, only one, truck transportation, experienced employment growth between 1998 and 2002, and the rate was less than one percent (.47%). Alternately, the other four of these industries exhibited declining national employment from 1998 to 2002. Of these, the sharpest decline can be seen in primary metal manufacturing *(-18.55%).*

2. Average Worker Wages and Income

Table 26 provides the US average hourly wages and annual incomes for the selected industry clusters. The highest wages and annual salaries can be seen in the 3-

digit code 336, transportation equipment manufacturing. This industry has an hourly

wage of $21.22 and an annual income of $45,390. Conversely, the lowest paying industry

can be seen in the 3-digit code 311, food manufacturing. This industry had an hourly

wage of $13.81 and an annual salary of $28,720.

It should be noted that Table 26 provides the average wages and annual incomes

for 3-digit industry groupings. Wage diversity will be present within a grouping and

certainly within an actual firm. Thus, information on industry wage and income is just a

first approximation of the potential impacts of industry recruitment.

3. Industry Multipliers

Income multipliers for four of the five selected industries are provided in Table

27. Fabricated metal manufacturing, NAICS code 332, has the lowest multiplier (1.44)

while food manufacturing, NAICS code 311 has the highest multiplier (1.60).

4. Average Establishment Size

The 1997 US average size of firms in the five selected industries, in terms of

employees, is shown in Table 28. Industries with large employment levels provide greater

potential for immediate job generation than industries whose operations require, on

average, fewer employees (Barkley 2002). Average establishment employment among

the five industries ranged from 12 to 142. The greatest establishment size within the five

industries is seen in NAICS code 336, transportation equipment manufacturing (142).

5. Revenue per Worker

Industry revenue generated per worker is shown in Table 29. Among the five selected industries, revenue per worker varied widely, from $109,156 (truck transportation*)* to $309,419 (transportation equipment manufacturing*)*.

H. Index of Characteristics

The standardized values for the five industry characteristics are summed for each industry and are provided in Table 31. On the basis of this summation of the standardized values, the industry clusters with the most favorable economic development impacts are transportation equipment manufacturing (3.13) and food manufacturing (1.30). Clusters providing the least favorable impacts are truck transportation (-1.26) and fabricated metal manufacturing (-2.97). This, of course, is based on equal weighting of the five characteristics. Weighting one or more characteristics heavier than others would change the standardized values and could affect the ranking. Specific preferences by local economic development officials could allow weighting characteristics more than others so as to tailor rankings and preferences to a specific area.

It should be noted, however, that this index reflects the relative potential impacts of the Selected Clusters. Selected Clusters were selected as good candidates for industrial recruitment based on the presence of a growing cluster in the Target Region or in Putnam. These rankings simply indicate that some of the clusters may be more desirable than others based on economic impacts.

I. Personal Interviews

Personal interviews were conducted with the following individuals:

- *Clay*: Randal Gilman, Executive Director, Chamber of Commerce;

- *Fentress*: Scott Sandman, Executive Director, Chamber of Commerce;

- *Jackson*: Charlie Hix, County Mayor;

- *Overton*: John Roberts, Executive Director, Chamber of Commerce;

- *Pickett*: Deseret Peterson, Executive Director, Chamber of Commerce; and

- *Putnam*: Elleen Duncan, Chamber of Commerce.

For each of these individuals, several questions were asked pertaining to industrial activity within their county. The series of questions was pre-determined, and are as follows:

1. How many are currently employed, and what is the economic trend?

2. What special needs are endogenous to the community, and are these resources limited?

3. Are there any linkages to other industries?

4. In there any collaboration between businesses?

5. In there any strategy for recruitment of business?

It was intended to apply these questions systematically to each individual. However, personal interaction often causes conversation flow to deviate from an intended schedule. Such was the case in several of these cases. Nonetheless, these individuals

provided valuable information pertaining to the economic status of their county, the Target Region, and Putnam.

1. Clay: Randal Gilman, Executive Director, Chamber of Commerce

Mr. Gilman began by stating that Veltri Metal Products, a strong employer in Clay, recently went "belly up". Further, the other transportation equipment manufacturing company in Clay, Crotty-Tennessee, was in "serious trouble". Mr. Gilman indicated that Crotty-Tennessee employs over 200 people, but the best way to analyze the company is that they are "currently operating", and "currently" is not very optimistic. He expects the company to close operations within the next year.

Employment opportunities in Clay are becoming slimmer. Mr. Gilman attributes this loss of jobs to outsourcing and job migration overseas. For attraction of business to the area, the Chamber of Commerce is looking for "anything at all", according to Mr. Gilman. Currently, they are trying to recruit a company to utilize the former Veltri Metal Products building, which is vacant. He noted several strong leads, but did not express a timeframe or confidence level of a business locating to Clay. The leads, however, are in the automotive industry.

A former large employer in Clay was Osh-Kosh, an apparel manufacturer. Their facilities have been vacant for some time, and Mr. Gilman indicated another apparel company is, in fact, locating to Clay to utilize the former Osh-Kosh facilities. What company this is, Mr. Gilman declined to comment. He also did not express when that company would locate. They would start up, as Mr. Gilman said, when "they [the company] get all the details worked out".

Mr. Gilman states that the single largest determinant for companies locating to the area is inexpensive and abundant labor. Clay has a very high unemployment rate, so there are plenty of workers looking for jobs when a company locates in the vicinity. Mr. Gilman hopes that more companies will realize this advantage of the area and locate to Clay.

2. Fentress: Scott Sandman, Executive Director, Chamber of Commerce

Scott Sandman could never be reached. Attempts were made repeatedly, at different times, to no avail. Messages and calls were not returned.

3. Jackson: Charlie Hix, County Mayor

Mr. Hix had a positive and optimistic outlook on the economy of Jackson. Nielson & Bainbridge, a picture framing manufacturer, is a large employer in Jackson, and is getting stronger according to Mr. Hix. They employ over 300, and expanded the company a little over year ago. Further, Mr. Hix indicated that Neilson & Bainbridge leased out new space very recently with even more plans to expand.

Mr. Hix identifies another automotive equipment manufacturer, Eaton Corporation, which is "doing very well" according to Mr. Hix. Eaton employs over 150 people.

4. Overton: John Roberts, Executive Director, Chamber of Commerce

John Roberts of Overton provided valuable insight. Mr. Roberts is dedicated to economic improvement in Overton, and is very knowledgeable on the subject.

First off, Mr. Roberts identified Hutchison Inc, which manufactures automotive sun visors for automobiles. Hutchison has two facilities in Overton, according to Mr. Roberts, and each employs well over 300.

Another strong employer in Overton is the Eaton Corporation, which manufactures automotive spoilers. Eaton not only employs over 300, but recently moved its corporate headquarters from Atlanta to Overton.

Mr. Roberts is quite optimistic concerning these two companies. One factor to keep in mind, he claims, is whether a company utilizes local residents as upper management. This keeps quality management and upper-level incomes within the local economy. Also, a company is more likely to stay in the area if at all possible if the management has other connections to the local area.

Another company, a French company, is locating to Overton in the near future. This company manufactures air conditioning parts for automobiles. Mr. Roberts is "very confident" of their locating soon, but declined giving more information concerning this company.

Berkline, a furniture manufacturer, is a very robust employer in Overton according to Mr. Roberts. Berkline employs between 600 and 900 at any given time. When discussing this company, Mr. Roberts identified an interesting point. Most of Berkline's operations are in Mississippi because of worker's compensation laws. Tennessee, according to Mr. Roberts, legislates worker's compensation that costs a company 35% more than in Mississippi and other states. If a company is a large employer, this can translate to significant costs.

Beyond discussing manufacturing and business in Overton, Mr. Roberts discussed at length the role of retirement opportunities in economic development. Most areas, Mr. Roberts claims, focus solely on attracting jobs. That is the easy fix, he says, because it requires little commitment and effort on the part of the local government. Retired people are looking for different qualities in an area, and most localities are not willing to go to the time and trouble to offer those qualities. The significance, according to Mr. Roberts is that a retired couple is economically worth 3.8 manufacturing jobs. Retired couples do not strain local infrastructure such as schools, jails, etc. They do, however, pay taxes like everyone else, have disposable income, donate to charitable causes in the area, and are willing to actively participate in the community. For these reasons, Mr. Roberts believes that retired couples can be a significant economic boon to the area, and Overton has made considerable investment in retirement opportunities.

5. Pickett: Deseret Peterson, Executive Director, Chamber of Commerce

Ms. Peterson discussed only one industry in Pickett, DA-LO Industries, Inc. DA-LO is an ornamental metal manufacturer, according to Ms. Peterson. DA-LO employs approximately 20-30 people. One unique aspect is that DA-LO is a manufacturer and a retail operation, but the retail side is only through a catalogue ordering system.

6. Putnam: Elleen Duncan, Chamber of Commerce

Ms. Duncan did not disclose specific information concerning industries within Putnam. Instead she discussed why Putnam has such a strong economy. Putnam has a number of very strong industries, according to Ms. Duncan. The reason is, simply, that

Putnam is a good place to do business. Putnam is very accessible- good airports, excellent roads, and within one day's drive of 75% of the continental US. Basically, it is easy for people to get to Putnam. Ms. Duncan claims this gives Putnam advantages in three areas.

First is accessibility to labor markets. The Upper Cumberland has an abundance of inexpensive labor, and Putnam is very accessible to most of the Upper Cumberland. This gives a strong inflow of workers to Putnam, an attractive benefit for companies. Purdue Farms, a poultry manufacturer, draws employees from 11 surrounding counties and as far away as Kentucky, according to Ms. Duncan.

Second is convenience of exports from the Putnam community. When there is a strong, inexpensive labor force, Ms. Duncan claims, there is often a geographically remote area. Not so with Putnam. Goods and products can be shipped to anywhere in the US within a day and a half by truck or rail.

The third benefit is accessibility to retail markets. Ms. Duncan claims that shoppers come from as far away as Kentucky to do their shopping. For a good deal of surrounding areas, Putnam is the closest "big city", according to Ms. Duncan. For this reason, people will come far distances because Putnam is the closest place that meets all the needs of consumers.

Rounding out these benefits are other attractive qualities identified by Ms. Duncan. She claims Putnam is a "…wonderful place to live and work". There are a number of natural attractions. Crime and poverty are relatively low. Cost of living is relatively low. Putnam is, Ms. Duncan asserts, simply a good place to live and work.

VI. Conclusions

This study identified industrial clusters, referred to in this study as Selected Clusters, at the 3-digit NAICS code level in a five-county Target Region of the Upper-Cumberland as well as Putnam County. Further, these clusters were analyzed for characteristics including employment growth rate, average establishment size, average worker wages and income, industry multipliers, and revenue per worker.

A. Evaluation of Results

<u>1. Industry Statistics</u>

This study reveals five 3-digit NAICS code Selected Clusters. These are:

1. *Food manufacturing*, 311: Putnam

2. *Primary metal manufacturing*, 331: Target Region

3. *Fabricated metal manufacturing*, 332: Putnam

4. *Transportation equipment manufacturing*, 336: Target Region/Putnam

5. *Truck transportation*, 484: Putnam

These clusters were selected for economic development potential. Selections were made based on employment, establishments, positive growth over time, and location quotient.

Information for the Selected Clusters is presented in Table 30. For comparison, establishment, employment, and LQ information for Selected Clusters is provided for both the Target Region and Putnam. Table 30 also presents combined information-Selected Clusters employment and establishments were summed, and LQ is calculated based on summing the total employment for the Target Region and Putnam.

2. Personal Interviews

One idea noticeably missing from county contacts was a sense of collaboration, or even recognition, of the inter-relatedness of the Target Region and Putnam. The one exception was that the Putnam contact mentioned a high number of workers commuting to Putnam from other counties. Limiting development efforts to individual counties can have a negative impact on economic development, as industries do not adhere to political boundaries (Barkley, Henry, and Zhang).

In a general sense, most contacts did not identify specific industrial recruitment tactics. The prevalent mindset was that any job generation, regardless of the industry, was a positive impact. While true- new jobs are always beneficial to those without jobs- focusing only on job generation within a county can actually be a limiting approach. Examining the trends and changes on the regional, state, and national levels allows decision makers to target industries that can bring long-term benefits and stability to a region.

3. Selected Cluster Characteristics Evaluation

Economic development decision makers may be well served to be cognizant in regard to comparing industry characteristics to regional characteristics. One industry might have high wages, but also might require specialized labor and resources. If an area cannot provide such inputs, recruitment of that industry would be fruitless. This is especially pertinent for this study. The Target Region has relatively low educational

attainment, and the occupational distribution illuminates a general "blue collar" workforce.

Another characteristic to be noted with regard to the Target Region, as a rural area, is average establishment size. Industries with large establishment sizes need, not only an available labor pool, but a relatively large labor pool. For this reason, a rural area might only be able to support one or two large industries. Recruitment of further firms then would be fruitless. For this reason, decision makers should consider the population density of an area in regard to industries recruited. A rural area might be well served by pursuing smaller industries, which could result in more firms with lower sizes. For example, if an area had an available labor pool of 1000 workers, only one 600-employee firm could be supported, while ten 100-employ firms could also be supported and would more fully utilize the labor pool.

B. Limitations of This Study

One of the primary limitations of this study is the compressed time frame. Using the time period of 1998 to 2002 for data collection only gives a span of five years. A longer time period would be preferable to better show trends- both regional and national. The cause of this limitation is the discrepancy between the SIC system that was in place before 1997 and the NAICS that replaced it.

Another limitation is the delayed release of the 2002 US Economic Census data. If this information were available, more timely and up-to-date data could be utilized.

From a geographic standpoint, valuable information could be gained by studying this data on a sub-county level. Firm location could possibly show trends on a sub-county level that does not show up on a regional analysis.

C. Possibilities for Further Research

Several possibilities for further research emerged from this study. One very important possibility is research into the forward and backward linkages in these five selected clusters. For detailed economic development plans, this information could be very useful. For economic development officials, this would be a logical step following this study.

Another potential area for research is in recreation and tourism. As shown in Table 5, leisure and hospitality employment in the Target Region increased by 13.19% between 2001 and 2003. Many rural regions of the US are making forays into this industry. With the natural amenities- mountains, lakes, etc. - of the Target Region, recreation and tourism could be an alternate venue for long term economic improvement.

Another possibility for further research, one that could potentially relate to recreation and tourism, is the economic effect of retirees on a region. This facet of economic development was identified by the county contact in Overton. Overton is currently using this mentality as a basis for community and economic development.

Along the same line, a study of the effectiveness of rural economic development plans, for a long period of time, would be very valuable. This type of research was noticeably missing in the review of literature.

List of References

List of References

1. Porter, M. "Clusters and the New Economics of Competition." *Harvard Business Review* 76 (1998): 77-90.

2. Freshwater, D. "Rural America at the Turn of the Century. One Analyst's Perspective." *Rural America* 15 (2000): 2-7.

3. Scorsone, E. "Industrial Clusters: Enhancing rural economies through business linkages." *The Rural South: Preparing for the Challenges of the 21st Century* 23 (2002): 1-8.

4. Johnson, T. G. "The Rural Economy in a New Century." *International Regional Science Review* 24 (2001): 21-37.

5. Barkley, D. "Employment Generation Strategies for Small Towns: An Overview of the Alternatives." Research Report 09-2001-02, Regional Economic Development Research Laboratory, Clemson University, 2001.

6. Barkley, D., M. Henry, and M. Warner. "Targeting Growth Opportunities for Lancaster County, 2002." Research Report 10-2002-04, Regional Economic Development Research Laboratory, Clemson University, 2004.

7. Leatherman, J., D. Howard, and T. Kastens. "Improved Prospects for Rural Development: An Industrial Targeting System for the Great Plains." *Review of Agricultural Economics* 24: (2002): 59-77.

8. Nelson, J., M. Woods, D. Mike, and G.A. Doeksen. "Using Targeted Industry Analysis in a Comprehensive Economic Development Extension Program". Paper presented at the Industry Targeting Workshop, Orlando, FL, December 2004.

9. Galston, W. A., and K. J. Baehler. *Rural Development in the United States*. Washington, DC: Island Press, 1995.

10. Shaffer, R., S. Deller, and D. Marcouiller. *Community Economics- Linking Theory and Practice,* 2nd ed. Ames, IA: Blackwell Publishing, 2004.

11. Hite, J. "The Thunen Model and the New Economic Geography as a Paradigm for Rural Development Policy." *Review of Agricultural Economics* 19 (1997): 230-240.

12. Barkley, D. L. and M. S. Henry. "Rural Industrial Development: To Cluster or Not to Cluster?" *Review of Agricultural Economics* 19 (1997): 308-325.

13. National Agricultural Statistics Service QuickStats. Available online at *http://www.nass.usda.gov/QuickStats/,* 2003.

14. US Census Bureau QuickFacts. Available online at http://quickfacts.census.gov/qfd/, 2003.

15. US Census Bureau County-to-County Worker Flow Files Available online at http://www.census.gov/population/www/cen2000/commuting.html, 2000.

16. US Census Bureau County Business Patterns. Available online at http://censtats.census.gov/cbpnaic/cbpnaic.shtml, 1998, 2002

17. Yellow Pages. Available at www.yellow.com, 2005

18. IMPLAN. Available online at www.implan.com.

Appendix

Table 1. Total Employment 1997-2003: Target Region, Tennessee, US

Year	Clay	Fentress	Overton	Jackson	Pickett	Target Region	Tennessee	US
1997	*1,689*	*4,316*	*4,460*	*2,025*	*1,101*	**13,591**	2,522,860	121,044,432
1998	*1,649*	*4,125*	*4,483*	*1,917*	*1,192*	**13,366**	2,578,025	124,183,549
1999	*1,793*	*3,985*	*4,425*	*1,903*	*1,115*	**13,221**	2,627,044	127,042,282
2000	*1,831*	*3,792*	*4,432*	*1,862*	*1,098*	**13,015**	2,667,230	129,877,063
2001	*1,768*	*3,625*	*4,422*	*1,809*	*930*	**12,554**	2,625,746	129,635,800
2002	*1,787*	*3,693*	*4,377*	*1,895*	*885*	**12,637**	2,601,518	128,233,919
2003	*1,854*	*3,745*	*4,297*	*1,925*	*896*	**12,717**	2,598,748	127,795,827

Source: Bureau of Labor Statistics: Current Employment Statistics Survey

Table 2. Unemployment Rates 1997-2003: Target Region, Tennessee, US

Year	Clay	Fentress	Overton	Jackson	Pickett	Target Region	Tennessee	US
1997	*27.4*	*9.8*	*9.7*	*8.1*	*8.1*	11.56	5.4	4.9
1998	*14.1*	*9.6*	*7.5*	*9*	*6*	9.04	4.2	4.5
1999	*12.1*	*10.9*	*5.8*	*8.8*	*6.5*	8.68	4	4.2
2000	*10.8*	*10.5*	*6.1*	*7.6*	*4.9*	8.16	4	4
2001	*10.3*	*11.1*	*6.7*	*6.1*	*9.2*	8.58	4	4.7
2002	*10.5*	*8.9*	*6.5*	*7.4*	*8.4*	8.04	5.2	5.8
2003	*12.7*	*9.2*	*6.3*	*8.8*	*6.7*	8.49	5.5	6

Source: Bureau of Labor Statistics: Local Area Unemployment Statistics

Table 3. Nominal Per Capita Income 1997-2002 ($/person): Target Region, Tennessee, US

Year	Clay	Fentress	Overton	Jackson	Pickett	Target Region	Tennessee	US
1997	*15,324*	*16,443*	*16,048*	*16,375*	*15,473*	16,086	22,676	25,334
1998	*15,985*	*17,001*	*16,892*	*17,295*	*16,144*	16,805	23,989	26,883
1999	*16,565*	*17,760*	*17,436*	*17,855*	*16,421*	17,390	24,898	27,939
2000	*18,143*	*18,599*	*18,373*	*18,481*	*17,494*	18,348	26,099	29,847
2001	*19,368*	*19,774*	*19,399*	*19,603*	*17,221*	19,371	26,916	30,527
2002	*20,220*	*20,388*	*20,172*	*20,578*	*17,541*	20,119	27,611	30,906

Source: Bureau of Economic Analysis: Regional Economic Accounts

Table 4. 2003 Non-Farm Employment by Super Sector: Target Region, Tennessee, US

Industry	Target Region	% of Total	Tennessee	% of Total	U.S.	% of Total
Natural Resources and Mining	199	2.10	10,232	0.46	1,656,345	1.55
Construction	387	4.08	115,423	5.23	6,672,360	6.23
Manufacturing	3,063	32.27	410,750	18.63	14,459,712	13.51
Utilities	2,155	22.70	575,201	26.09	25,041,844	23.39
Information	114	1.20	50,488	2.29	3,180,752	2.97
Financial Activities	519	5.47	137,200	6.22	7,826,930	7.31
Services	330	3.48	287,807	13.05	15,858,457	14.81
Education and Health Services	1,647	17.35	299,149	13.57	15,738,013	14.70
Leisure and Hospitality	944	9.94	246,684	11.19	12,162,238	11.36
Other Services	128	1.35	70,012	3.18	4,261,165	3.98
Unclassified	7	0.07	1,934	0.09	207,738	0.19
Total Non-Farm:	9,493	100.00	2,204,880	100.00	107,065,554	100.00

Source: Bureau of Labor Statistics: Current Employment Statistics

Table 5. 2001-2003 Non-Farm Employment Change by SuperSector: Target Region, US

Industry	Target Region			U.S.		
	2001	2003	% Change	2001	2003	% Change
Natural Resources and Mining	201	199	-1.00	1,705,759	1,656,345	-2.90
Construction	364	387	6.32	6,773,512	6,672,360	-1.49
Manufacturing	3,370	3,063	-9.11	16,386,001	14,459,712	-11.76
Trade, Transportation, and Utilities	1,956	2,155	10.17	25,648,091	25,041,844	-2.36
Information	79	114	44.30	3,591,995	3,180,752	-11.45
Financial Activities	485	519	7.01	7,678,974	7,826,930	1.93
Professional and Business Services	312	330	5.77	16,324,890	15,858,457	-2.86
Education and Health Services	1,624	1,647	1.42	14,849,666	15,738,013	5.98
Leisure and Hospitality	834	944	13.19	11,884,966	12,162,238	2.33
Other Services	117	128	9.40	4,206,345	4,261,165	1.30
Unclassified	0	7	0.00	254,603	207,738	-18.41
Total Non-Farm	9,342	9,493	1.62	109,304,802	107,065,554	-2.05

Source: Bureau of Labor Statistics: Current Employment Statistics

Table 6. 2000 Educational Distribution: Target Region, Tennessee, US

	Target	% of Total	Tennessee	% of Total	US	% of Total
Population 25 years and older	*41,786*		*3,744,928*		*182,211,639*	
Less than 9th grade	9,875	23.63%	359,789	9.61	13,755,477	7.55
9th to 12th grade, no diploma	7,156	17.13%	541,895	14.47	21,960,148	12.05
High school graduate (includes equivalency)	15,908	38.07%	1,182,699	31.58	52,168,981	28.63
Some college, no degree	4,613	11.04%	750,149	20.03	38,351,595	21.05
Associate degree	808	1.93%	177,708	4.75	11,512,833	6.32
Bachelor's degree	2,205	5.28%	478,463	12.78	28,317,792	15.54
Graduate or professional degree	1,221	2.92%	254,225	6.79	16,144,813	8.86
Percent high school graduate or higher	59.84		75.9		80.4	
Percent bachelor's degree or higher	8.18		19.6		24.4	

Source: US Census Bureau: 2000 Census; Persons 25 Years and Older

Table 7. 2000 Occupational Distribution: Target Region, Tennessee, US

	Target Region	% of Total	Tennessee	% of Total	US	% of Total
Employed population 16 years and over	*25,392*	*100.00*	*2,651,638*	*100.00*	*129,721,512*	*100.00*
Occupation						
Management, professional, and related occupations	5,091	20.05	781,153	29.46	43,646,731	33.65
Service occupations	3,168	12.48	362,941	13.69	19,276,947	14.86
Sales and office occupations	5,063	19.94	692,499	26.12	34,621,390	26.69
Farming, fishing, and forestry occupations	549	2.16	14,645	0.55	951,810	0.73
Construction, extraction, and maintenance occupations	3,407	13.42	272,164	10.26	12,256,138	9.45
Production, transportation, and material moving occupations	8,114	31.95	528,236	19.92	18,968,496	14.63

Source: US Census Bureau: QuickFacts, employed persons 16 year and over

Table 8. 1998 Target Region 3-digit Industries

Code	Industry	Establishments	Target Region Employment (Midpoint)	% Total	US Employment	% Total	LQ
113	Forestry and logging	6	38	0.32	84,170	0.08	4.10
115	Agriculture & forestry sup	5	98	0.82	93,650	0.09	9.50
213	Mining support activities	1	9.5	0.08	175,501	0.16	0.49
221	Utilities	5	77.5	0.65	682,217	0.63	1.03
233	Building, developing & g	32	108.5	0.91	1,434,123	1.33	0.69
234	Heavy construction	14	139	1.17	803,924	0.74	1.57
235	Special trade contractors	49	268.5	2.25	3,560,214	3.29	0.68
311	Food mfg	2	174.5	1.46	1,464,419	1.35	1.08
312	Beverage & tobacco prod	1	39.5	0.33	172,892	0.16	2.07
313	Textile mills	1	9.5	0.08	385,454	0.36	0.22
315	Apparel manufacturing	14	1573.5	13.20	671,184	0.62	21.28
321	Wood product mfg	19	642.5	5.39	580,290	0.54	10.05
322	Paper mfg	1	9.5	0.08	567,891	0.53	0.15
323	Printing & related suppor	2	9.5	0.08	845,053	0.78	0.10
325	Chemical mfg	1	9.5	0.08	900,706	0.83	0.10
326	Plastics & rubber product	4	214	1.80	1,030,378	0.95	1.89
327	Nonmetallic mineral prod	4	58.5	0.49	508,270	0.47	1.04
331	Primary metal mfg	2	384	3.22	615,171	0.57	5.67
332	Fabricated metal product	10	398	3.34	1,816,198	1.68	1.99
333	Machinery mfg	3	58.5	0.49	1,444,438	1.34	0.37
334	Computer & electronic pr	1	39.5	0.33	1,680,833	1.55	0.21
335	Electrical equip, appliance	1	39.5	0.33	602,395	0.56	0.60
336	Transportation equipment	2	749	6.28	1,911,337	1.77	3.56
337	Furniture & related produ	7	155.5	1.30	603,853	0.56	2.34
339	Miscellaneous mfg	4	184	1.54	737,392	0.68	2.27
421	Wholesale trade, durable	10	65	0.55	3,466,550	3.21	0.17
422	Wholesale trade, nondura	17	85	0.71	2,418,396	2.24	0.32
441	Motor vehicle & parts dea	34	120.5	1.01	1,757,196	1.63	0.62
442	Furniture & home furnish	5	58.5	0.49	509,699	0.47	1.04
443	Electronics & appliance s	2	19	0.16	361,876	0.33	0.48
444	Bldg material & garden e	25	202	1.69	1,131,161	1.05	1.62

Table 8. Continued.

Code	Industry	Establishments	Target Region Employment (Midpoint)	% Total	US Employment	% Total	LQ
445	Food & beverage stores	26	331.5	2.78	2,943,644	2.72	1.02
446	Health & personal care st	13	71	0.60	940,220	0.87	0.69
447	Gasoline stations	44	223	1.87	946,405	0.88	2.14
448	Clothing & clothing acces	11	40.5	0.34	1,280,356	1.18	0.29
451	Sporting goods, hobby, bc	2	9.5	0.08	579,768	0.54	0.15
452	General merchandise stor	16	258	2.16	2,479,150	2.29	0.94
453	Miscellaneous store retail	18	55.5	0.47	795,891	0.74	0.63
454	Nonstore retailers	1	39.5	0.33	515,360	0.48	0.70
481	Air transportation	1	9.5	0.08	560,023	0.52	0.15
484	Truck transportation	26	105.5	0.89	1,327,086	1.23	0.72
485	Transit & ground passeng	2	9.5	0.08	349,343	0.32	0.25
511	Publishing industries	6	68	0.57	1,011,090	0.94	0.61
513	Broadcasting & telecomm	8	203	1.70	1,462,680	1.35	1.26
522	Credit intermediation & re	25	256.5	2.15	2,688,253	2.49	0.87
523	Security, commodity cont	1	9.5	0.08	724,207	0.67	0.12
524	Insurance carriers & relate	21	89.5	0.75	2,312,341	2.14	0.35
531	Real estate	11	37.5	0.31	1,197,428	1.11	0.28
532	Rental & leasing services	13	167	1.40	592,602	0.55	2.56
541	Professional, scientific &	47	138	1.16	6,051,636	5.60	0.21
551	Management of companie	2	49	0.41	2,703,798	2.50	0.16
561	Administrative & support	14	107	0.90	7,487,211	6.93	0.13
562	Waste management & ren	3	19	0.16	287,399	0.27	0.60
611	Educational services	1	9.5	0.08	2,323,744	2.15	0.04
621	Ambulatory health care se	49	756	6.34	4,482,156	4.15	1.53
622	Hospitals	3	1123.5	9.43	5,011,337	4.64	2.04
623	Nursing & residential care	6	602.5	5.05	2,511,150	2.32	2.18
624	Social assistance	30	184	1.54	1,753,353	1.62	0.95
713	Amusement, gambling &	13	100.5	0.84	1,175,221	1.09	0.78
721	Accommodation	11	45	0.38	1,708,002	1.58	0.24
722	Food services & drinking	50	549.5	4.61	7,758,086	7.18	0.64
811	Repair & maintenance	33	73.5	0.62	1,302,873	1.21	0.51

Table 8. Continued.

Code	Industry	Establishments	Target Region Employment (Midpoint)	% Total	US Employment		LQ
812	Personal & laundry servic	18	83	0.70	1,247,387	1.15	0.60
813	Religious, grantmaking, c	44	78.5	0.66	2,487,606	2.30	0.29
95----	Auxiliaries (exc corporate	2	19	0.16	916,349	0.85	0.19
99----	Unclassified establishmen	2	9.5	0.08	77,642	0.07	1.11
	Total:	857	11968.5	100.00		100.00	
				Total US:	108,117,731		

Source: US Census Bureau: 1998 County Business Patterns

Table 9. 2002 Target Region 3-Digit Industries

Code	Industry	Establishments	Target Region Employment (Midpoint)	% Total	US Employment	% Total	LQ
113	Forestry and logging	13	47.5	0.46	75,822	0.07	**6.81**
115	Agriculture & forestry su	2	19	0.18	96,096	0.09	**2.15**
212	Mining (except oil & gas)	4	88.5	0.86	194,174	0.17	**4.95**
213	Mining support activities	3	19	0.18	183,321	0.16	**1.13**
221	Utilities	6	77.5	0.75	648,254	0.58	**1.30**
233	Building, developing & g	37	138.5	1.34	1,585,717	1.41	0.95
234	Heavy construction	9	80	0.77	856,312	0.76	**1.02**
235	Special trade contractors	53	233.5	2.26	3,865,341	3.44	0.66
312	Beverage & tobacco prod	2	49	0.47	163,395	0.15	**3.26**
314	Textile product mills	1	39.5	0.38	190,209	0.17	**2.26**
315	Apparel manufacturing	4	88.5	0.86	350,439	0.31	**2.74**
321	Wood product mfg	20	434	4.20	534,011	0.48	**8.83**
322	Paper mfg	1	9.5	0.09	495,990	0.44	0.21
323	Printing & related suppor	2	9.5	0.09	706,419	0.63	0.15
325	Chemical mfg	1	9.5	0.09	827,430	0.74	0.12
326	Plastics & rubber product	3	374.5	3.62	925,607	0.82	**4.40**
327	Nonmetallic mineral prod	4	49	0.47	475,476	0.42	**1.12**
331	Primary metal mfg	2	384	3.71	501,038	0.45	**8.33**
332	Fabricated metal product	11	242.5	2.35	1,582,399	1.41	**1.67**
333	Machinery mfg	3	49	0.47	1,166,221	1.04	0.46
335	Electrical equip, applianc	1	39.5	0.38	502,400	0.45	0.85
336	Transportation equipment	6	923.5	8.93	1,578,707	1.40	**6.36**
337	Furniture & related produ	7	128	1.24	575,128	0.51	**2.42**
339	Miscellaneous mfg	4	349	3.37	664,710	0.59	**5.71**
421	Wholesale trade, durable	8	102	0.99	3,443,697	3.06	0.32
422	Wholesale trade, nondura	14	106	1.03	2,416,559	2.15	0.48
441	Motor vehicle & parts dea	23	100.5	0.97	1,890,916	1.68	0.58
442	Furniture & home furnish	5	28.5	0.28	551,567	0.49	0.56

Table 9. Continued.

Code	Industry	Establishments	Target Region Employment (Midpoint)	% Total	US Employment	% Total	LQ
443	Electronics & appliance s	3	28.5	0.28	418,725	0.37	0.74
444	Bldg material & garden e	32	267.5	2.59	1,270,736	1.13	**2.29**
445	Food & beverage stores	35	513.5	4.97	2,883,997	2.57	**1.94**
446	Health & personal care st	12	99	0.96	988,347	0.88	1.09
447	Gasoline stations	45	174	1.68	895,983	0.80	**2.11**
448	Clothing & clothing acce	6	50.5	0.49	1,408,948	1.25	0.39
451	Sporting goods, hobby, b	2	19	0.18	617,726	0.55	0.33
452	General merchandise stor	19	242.5	2.35	2,546,094	2.27	**1.04**
453	Miscellaneous store retail	18	47	0.45	822,992	0.73	0.62
454	Nonstore retailers	5	38	0.37	523,873	0.47	0.79
484	Truck transportation	23	79	0.76	1,333,342	1.19	0.64
485	Transit & ground passeng	1	9.5	0.09	387,325	0.34	0.27
488	Transportation support ac	1	9.5	0.09	475,466	0.42	0.22
511	Publishing industries	6	68	0.66	1,019,976	0.91	0.72
513	Broadcasting & telecomm	10	203	1.96	1,698,408	1.51	**1.30**
514	Information & data proce	1	9.5	0.09	539,337	0.48	0.19
522	Credit intermediation & r	28	324.5	3.14	3,006,084	2.67	**1.17**
523	Security, commodity con	1	9.5	0.09	1,008,867	0.90	0.10
524	Insurance carriers & relat	19	84	0.81	2,342,005	2.08	0.39
531	Real estate	14	52	0.50	1,351,973	1.20	0.42
532	Rental & leasing services	12	110	1.06	641,322	0.57	**1.86**
541	Professional, scientific &	52	162.5	1.57	7,046,205	6.27	0.25
551	Management of companie	2	214	2.07	2,913,798	2.59	0.80
561	Administrative & support	11	107.5	1.04	7,998,637	7.12	0.15
562	Waste management & rer	4	28.5	0.28	300,580	0.27	**1.03**
611	Educational services	1	9.5	0.09	2,701,675	2.40	0.04
621	Ambulatory health care s	49	519	5.02	4,917,156	4.37	**1.15**
622	Hospitals	3	549	5.31	5,121,584	4.56	**1.17**
623	Nursing & residential car	6	737.5	7.13	2,770,665	2.46	**2.89**
624	Social assistance	27	167.5	1.62	2,090,743	1.86	0.87
712	Museums, historical sites	1	9.5	0.09	116,123	0.10	0.89
713	Amusement, gambling &	12	77.5	0.75	1,314,539	1.17	0.64
721	Accommodation	7	77.5	0.75	1,696,701	1.51	0.50

Table 9. Continued.

Code	Industry	Establishments	Target Region Employment (Midpoint)	% Total	US Employment	% Total	LQ
722	Food services & drinking	57	667.5	6.45	8,352,174	7.43	0.87
811	Repair & maintenance	34	70.5	0.68	1,334,875	1.19	0.57
812	Personal & laundry servi	20	80.5	0.78	1,314,320	1.17	0.67
813	Religious, grantmaking,	46	118	1.14	2,770,892	2.47	0.46
95----	Auxiliaries (exc corporat	2	49	0.47	1,011,496	0.90	0.53
99----	Unclassified establishmer	8	39	0.38	32,769	0.03	**12.94**
	TOTAL:	884	10341	100.00			
			Total US Employment:		112,400,654	100.00	

Source: US Census Bureau: 2002 County Business Patterns

Table 10. 1998-2002 Target Region Change in Establishments, Employment, LQ

Code	Industry	Establishments			Employment			LQ		
		1998	2002	% Change	1998	2002	% Change	1998	2002	% Change
113	Forestry and logging	6	13	116.67	38	47.5	25.00	4.10	6.81	66.15
115	Agriculture & forestr	5	2	-60.00	98	19	-80.61	9.50	2.15	-77.38
212	Mining (except oil &	*	4	0.00	*	88.5	0.00		4.95	0.00
213	Mining support activ	1	3	200.00	9.5	19	100.00	0.49	1.13	129.25
221	Utilities	5	6	20.00	77.5	77.5	0.00	1.03	1.30	26.01
233	Building, developing	32	37	15.63	108.5	138.5	27.65	0.69	0.95	38.23
234	Heavy construction	14	9	-35.71	139	80	-42.45	1.57	1.02	-35.30
235	Special trade contrac	49	53	8.16	268.5	233.5	-13.04	0.68	0.66	-4.09
311	Food mfg	2	*	0.00	174.5	*	0.00	1.08	*	0.00
312	Beverage & tobacco	1	2	100.00	39.5	49	24.05	2.07	3.26	57.17
313	Textile mills	1		-100.00	9.5	*	0.00	0.22	*	0.00
314	Textile product mills	*	1	0.00	*	39.5	0.00	*	2.26	0.00
315	Apparel manufacturi	14	4	-71.43	1573.5	88.5	-94.38	21.28	2.74	-87.10
321	Wood product mfg	19	20	5.26	642.5	434	-32.45	10.05	8.83	-12.11
322	Paper mfg	1	1	0.00	9.5	9.5	0.00	0.15	0.21	37.09
323	Printing & related su	2	2	0.00	9.5	9.5	0.00	0.10	0.15	43.23
325	Chemical mfg	1	1	0.00	9.5	9.5	0.00	0.10	0.12	30.34
326	Plastics & rubber pro	4	3	-25.00	214	374.5	75.00	1.89	4.40	133.25
327	Nonmetallic mineral	4	4	0.00	58.5	49	-16.24	1.04	1.12	7.21
331	Primary metal mfg	2	2	0.00	384	384	0.00	5.67	8.33	47.01
332	Fabricated metal prod	10	11	10.00	398	242.5	-39.07	1.99	1.67	-16.27
333	Machinery mfg	3	3	0.00	58.5	49	-16.24	0.37	0.46	24.22
334	Computer & electron	1	*	0.00	39.5	*	0.00	0.21	*	0.00
335	Electrical equip, appl	1	1	0.00	39.5	39.5	0.00	0.60	0.85	43.57
336	Transportation equip	2	6	200.00	749	923.5	23.30	3.56	6.36	78.74
337	Furniture & related p	7	7	0.00	155.5	128	-17.68	2.34	2.42	3.48
339	Miscellaneous mfg	4	4	0.00	184	349	89.67	2.27	5.71	151.94

Table 10. Continued.

Code	Industry	Establishments			Employment			LQ		
		1998	2002	% Change	1998	2002	% Change	1998	2002	% Change
421	Wholesale trade, dur:	10	8	-20.00	65	102	56.92	0.17	0.32	89.14
422	Wholesale trade, non	17	14	-17.65	85	106	24.71	0.32	0.48	49.43
441	Motor vehicle & part	34	23	-32.35	120.5	100.5	-16.60	0.62	0.58	-7.20
442	Furniture & home fu:	5	5	0.00	58.5	28.5	-51.28	1.04	0.56	-46.10
443	Electronics & applia:	2	3	50.00	19	28.5	50.00	0.48	0.74	55.22
444	Bldg material & gard	25	32	28.00	202	267.5	32.43	1.62	2.29	41.14
445	Food & beverage sto	26	35	34.62	331.5	513.5	54.90	1.02	1.94	89.31
446	Health & personal ca	13	12	-7.69	71	99	39.44	0.69	1.09	58.82
447	Gasoline stations	44	45	2.27	223	174	-21.97	2.14	2.11	-1.32
448	Clothing & clothing :	11	6	-45.45	40.5	50.5	24.69	0.29	0.39	35.67
451	Sporting goods, hobl	2	2	0.00	9.5	19	100.00	0.15	0.33	124.76
452	General merchandise	16	19	18.75	258	242.5	-6.01	0.94	1.04	9.58
453	Miscellaneous store 1	18	18	0.00	55.5	47	-15.32	0.63	0.62	-1.94
454	Nonstore retailers	1	5	400.00	39.5	38	-3.80	0.70	0.79	13.32
481	Air transportation	1	*	0.00	9.5	*	0.00	0.15	*	0.00
484	Truck transportation	26	23	-11.54	105.5	79	-25.12	0.72	0.64	-10.76
485	Transit & ground pas	2	1	-50.00	9.5	9.5	0.00	0.25	0.27	7.99
488	Transportation suppo	*	1	0.00	*	9.5	0.00	*	0.22	0.00
511	Publishing industries	6	6	0.00	68	68	0.00	0.61	0.72	18.69
513	Broadcasting & telec	8	10	25.00	203	203	0.00	1.26	1.30	3.12
514	Information & data p	*	1	0.00	*	9.5	0.00	*	0.19	0.00
522	Credit intermediation	25	28	12.00	256.5	324.5	26.51	0.87	1.17	35.46
523	Security, commodity	1	1	0.00	9.5	9.5	0.00	0.12	0.10	-14.05
524	Insurance carriers &	21	19	-9.52	89.5	84	-6.15	0.35	0.39	11.39
531	Real estate	11	14	27.27	37.5	52	38.67	0.28	0.42	47.05
532	Rental & leasing serv	13	12	-7.69	167	110	-34.13	2.56	1.86	-27.12
541	Professional, scientif	47	52	10.64	138	162.5	17.75	0.21	0.25	21.09
551	Management of com|	2	2	0.00	49	214	336.73	0.16	0.80	385.24
561	Administrative & su|	14	11	-21.43	107	107.5	0.47	0.13	0.15	12.60
562	Waste management &	3	4	33.33	19	28.5	50.00	0.60	1.03	71.73
611	Educational services	1	1	0.00	9.5	9.5	0.00	0.04	0.04	2.99
621	Ambulatory health ca	49	49	0.00	756	519	-31.35	1.53	1.15	-25.07

Table 10. Continued.

Code	Industry	Establishments			Employment			LQ		
		1998	2002	% Change	1998	2002	% Change	1998	2002	% Change
622	Hospitals	3	3	0.00	1123.5	549	-51.13	2.04	1.17	-42.75
623	Nursing & residentia	6	6	0.00	602.5	737.5	22.41	2.18	2.89	32.84
624	Social assistance	30	27	-10.00	184	167.5	-8.97	0.95	0.87	-8.59
712	Museums, historical	*	1	0.00	*	9.5	0.00	*	0.89	0.00
713	Amusement, gamblir	13	12	-7.69	100.5	77.5	-22.89	0.78	0.64	-17.45
721	Accommodation	11	7	-36.36	45	77.5	72.22	0.24	0.50	107.58
722	Food services & drin	50	57	14.00	549.5	667.5	21.47	0.64	0.87	35.10
811	Repair & maintenanc	33	34	3.03	73.5	70.5	-4.08	0.51	0.57	12.09
812	Personal & laundry s	18	20	11.11	83	80.5	-3.01	0.60	0.67	10.21
813	Religious, grantmaki	44	46	4.55	78.5	118	50.32	0.29	0.46	61.58
95----	Auxiliaries (exc corp	2	2	0.00	19	49	157.89	0.19	0.53	179.74
99----	Unclassified establisl	2	8	300.00	9.5	39	310.53	1.11	12.94	1064.65

Source: US Census Bureau: 1998,2002 County Business Patterns

Table 11. 1998 Putnam 3-Digit Industries

Code	Industry	Establishments	Putnam Employment (Midpoint)	% Total	US Employment	% Total	LQ
113	Forestry and logging	5	9.5	0.04	84,170	0.08	0.45
115	Agriculture & forestry support a	2	9.5	0.04	93,650	0.09	0.41
212	Mining (except oil & gas)	3	39.5	0.15	225,303	0.21	0.70
213	Mining support activities	1	9.5	0.04	175,501	0.16	0.22
221	Utilities	3	50	0.19	682,217	0.63	0.29
233	Building, developing & general	46	261	0.97	1,434,123	1.33	0.73
234	Heavy construction	16	309	1.15	803,924	0.74	1.54
235	Special trade contractors	75	639	2.37	3,560,214	3.29	0.72
311	Food mfg	6	1749.5	6.50	1,464,419	1.35	4.80
312	Beverage & tobacco product mf	1	9.5	0.04	172,892	0.16	0.22
314	Textile product mills	1	9.5	0.04	671,184	0.62	0.06
315	Apparel manufacturing	6	770	2.86	580,290	0.54	5.33
321	Wood product mfg	16	422	1.57	567,891	0.53	2.98
322	Paper mfg	3	174.5	0.65	845,053	0.78	0.83
323	Printing & related support activ	7	31	0.12	845,053	0.78	0.15
324	Petroleum & coal products mfg	1	39.5	0.15	111,000	0.10	1.43
325	Chemical mfg	2	39.5	0.15	900,706	0.83	0.18
326	Plastics & rubber products mfg	10	292	1.08	1,030,378	0.95	1.14
327	Nonmetallic mineral product mf	1	39.5	0.15	508,270	0.47	0.31
331	Primary metal mfg	3	102	0.38	615,171	0.57	0.67
332	Fabricated metal product mfg	30	899	3.34	1,816,198	1.68	1.99
333	Machinery mfg	15	767	2.85	1,444,438	1.34	2.13
334	Computer & electronic product	3	174.5	0.65	1,680,833	1.55	0.42
335	Electrical equip, appliance & co	4	9.5	0.04	602,395	0.56	0.06
336	Transportation equipment mfg	8	2010	7.47	1,911,337	1.77	4.22
337	Furniture & related product mfg	14	291	1.08	603,853	0.56	1.94
339	Miscellaneous mfg	12	565	2.10	737,392	0.68	3.08
421	Wholesale trade, durable goods	60	460	1.71	3,466,550	3.21	0.53

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Table 11. Continued.

Code	Industry	Establishments	Putnam Employment (Midpoint)	% Total	US Employment	% Total	LQ
422	Wholesale trade, nondurable go	37	652	2.42	2,418,396	2.24	1.08
441	Motor vehicle & parts dealers	48	532	1.98	1,757,196	1.63	1.22
442	Furniture & home furnishing sto	27	152	0.56	509,699	0.47	1.20
443	Electronics & appliance stores	17	131	0.49	361,876	0.33	1.45
444	Bldg material & garden equip &	31	390	1.45	1,131,161	1.05	1.38
445	Food & beverage stores	28	639	2.37	2,943,644	2.72	0.87
446	Health & personal care stores	24	153	0.57	940,220	0.87	0.65
447	Gasoline stations	56	375	1.39	946,405	0.88	1.59
448	Clothing & clothing accessories	43	370	1.37	1,280,356	1.18	1.16
451	Sporting goods, hobby, book &	24	111	0.41	579,768	0.54	0.77
452	General merchandise stores	13	784	2.91	2,479,150	2.29	1.27
453	Miscellaneous store retailers	45	256	0.95	795,891	0.74	1.29
454	Nonstore retailers	19	157	0.58	515,360	0.48	1.22
481	Air transportation	1	39.5	0.15	560,023	0.52	0.28
484	Truck transportation	31	966	3.59	1,327,086	1.23	2.92
485	Transit & ground passenger tran	2	9.5	0.04	349,343	0.32	0.11
488	Transportation support activities	2	9.5	0.04	421,740	0.39	0.09
492	Couriers & messengers	2	39.5	0.15	539,551	0.50	0.29
493	Warehousing & storage	4	2	0.01	119,493	0.11	0.07
511	Publishing industries	5	39.5	0.15	1,011,090	0.94	0.16
512	Motion picture & sound recordi	4	39.5	0.15	281,701	0.26	0.56
513	Broadcasting & telecommunicat	11	210	0.78	1,462,680	1.35	0.58
514	Information & data processing s	1	39.5	0.15	386,486	0.36	0.41
522	Credit intermediation & related	51	409	1.52	2,688,253	2.49	0.61
523	Security, commodity contracts &	8	39.5	0.15	724,207	0.67	0.22
524	Insurance carriers & related acti	32	174.5	0.65	2,312,341	2.14	0.30
531	Real estate	40	106	0.39	1,197,428	1.11	0.36
532	Rental & leasing services	15	85	0.32	592,602	0.55	0.58
541	Professional, scientific & techni	115	619	2.30	6,051,636	5.60	0.41
551	Management of companies & er	5	374.5	1.39	2,703,798	2.50	0.56
561	Administrative & support servic	69	1749.5	6.50	7,487,211	6.93	0.94
562	Waste management & remediati	1	9.5	0.04	287,399	0.27	0.13
611	Educational services	8	53	0.20	2,323,744	2.15	0.09

Table 11. Continued.

Code	Industry	Establishments	Putnam Employment (Midpoint)	% Total	US Employment	% Total	LQ
621	Ambulatory health care services	112	939	*3.49*	4,482,156	*4.15*	0.84
622	Hospitals	1	1749.5	*6.50*	5,011,337	*4.64*	1.40
623	Nursing & residential care facili	10	485	*1.80*	2,511,150	*2.32*	0.78
624	Social assistance	29	174.5	*0.65*	1,753,353	*1.62*	0.40
711	Performing arts, spectator sports	3	3	*0.01*	312,051	*0.29*	0.04
713	Amusement, gambling & recrea	15	87	*0.32*	1,175,221	*1.09*	0.30
721	Accommodation	16	293	*1.09*	1,708,002	*1.58*	0.69
722	Food services & drinking places	118	2326	*8.64*	7,758,086	*7.18*	1.20
811	Repair & maintenance	67	263	*0.98*	1,302,873	*1.21*	0.81
812	Personal & laundry services	44	256	*0.95*	1,247,387	*1.15*	0.82
813	Religious, grantmaking, civic, p	75	447	*1.66*	2,487,606	*2.30*	0.72
	Total:	1663	26920.5	*100.00*			
	Total US Employment:				108,117,731		

Source: US Census Bureau: 1998 County Business Patterns

Table 12. 2002 Putnam 3-Digit Industries

Code	Industry	Establishments	Putnam Employment (Midpoint)	% Total	US Employment	% Total	LQ
113	Forestry and logging	6	39.5	0.15	75,822	0.07%	2.23
115	Agriculture & forestry suppor	1	9.5	0.04	96,096	0.07	0.42
212	Mining (except oil & gas)	4	45	0.17	194,174	0.09	0.99
221	Utilities	3	39.5	0.15	648,254	0.17	0.26
233	Building, developing & genera	43	298	1.13	1,585,717	0.58	0.80
234	Heavy construction	14	259	0.99	856,312	1.41	1.29
235	Special trade contractors	70	741	2.82	3,865,341	0.76	0.82
311	Food mfg	6	1749.5	6.66	1,443,766	3.44	5.19
312	Beverage & tobacco product n	1	39.5	0.15	163,395	1.28	1.03
314	Textile product mills	2	39.5	0.15	190,209	0.15	0.89
315	Apparel manufacturing	1	39.5	0.15	350,439	0.17	0.48
321	Wood product mfg	15	285	1.09	534,011	0.31	2.28
322	Paper mfg	2	39.5	0.15	495,990	0.48	0.34
323	Printing & related support acti	7	15	0.06	706,419	0.44	0.09
325	Chemical mfg	1	39.5	0.15	827,430	0.63	0.20
326	Plastics & rubber products mf	10	369	1.40	925,607	0.74	1.71
327	Nonmetallic mineral product n	1	9.5	0.04	475,476	0.82	0.09
331	Primary metal mfg	2	39.5	0.15	501,038	0.42	0.34
332	Fabricated metal product mfg	25	878	3.34	1,582,399	0.45	2.37
333	Machinery mfg	18	1172	4.46	1,166,221	1.41	4.30
334	Computer & electronic produc	1	39.5	0.15	1,300,411	1.04	0.13
335	Electrical equip, appliance &	2	9.5	0.04	502,400	1.16	0.08
336	Transportation equipment mfg	6	1284	4.89	1,578,707	0.45	3.48
337	Furniture & related product m	10	228	0.87	575,128	1.40	1.70
339	Miscellaneous mfg	10	280	1.07	664,710	0.51	1.80
421	Wholesale trade, durable good	56	431	1.64	3,443,697	0.59	0.54
422	Wholesale trade, nondurable g	31	550	2.09	2,416,559	3.06	0.97
441	Motor vehicle & parts dealers	41	533	2.03	1,890,916	2.15	1.21

Table 12. Continued.

Code	Industry	Establishments	Putnam Employment (Midpoint)	% Total	US Employment	% Total	LQ
442	Furniture & home furnishing s	19	123	0.47	551,567	0.49	0.95
443	Electronics & appliance stores	12	82	0.31	418,725	0.37	0.84
444	Bldg material & garden equip	40	495	1.88	1,270,736	1.13	1.67
445	Food & beverage stores	31	543	2.07	2,883,997	2.57	0.81
446	Health & personal care stores	28	227	0.86	988,347	0.88	0.98
447	Gasoline stations	59	485	1.85	895,983	0.80	2.32
448	Clothing & clothing accessori	38	309	1.18	1,408,948	1.25	0.94
451	Sporting goods, hobby, book a	28	161	0.61	617,726	0.55	1.12
452	General merchandise stores	15	933	3.55	2,546,094	2.27	1.57
453	Miscellaneous store retailers	40	316	1.20	822,992	0.73	1.64
454	Nonstore retailers	16	132	0.50	523,873	0.47	1.08
484	Truck transportation	35	1749.5	6.66	1,333,342	1.19	5.61
485	Transit & ground passenger tr	2	9.5	0.04	387,325	0.34	0.10
488	Transportation support activiti	1	9.5	0.04	475,466	0.42	0.09
492	Couriers & messengers	5	39.5	0.15	475,466	0.42	0.36
493	Warehousing & storage	1	9.5	0.04	553,250	0.49	0.07
511	Publishing industries	1	9.5	0.04	149,409	0.13	0.27
512	Motion picture & sound recor	2	39.5	0.15	1,019,976	0.91	0.17
513	Broadcasting & telecommunic	22	280	1.07	1,698,408	1.51	0.71
514	Information & data processing	4	39.5	0.15	539,337	0.48	0.31
522	Credit intermediation & relate	61	412	1.57	3,006,084	2.67	0.59
523	Security, commodity contracts	11	39.5	0.15	1,008,867	0.90	0.17
524	Insurance carriers & related ac	31	174.5	0.66	2,342,005	2.08	0.32
531	Real estate	41	103	0.39	1,351,973	1.20	0.33
532	Rental & leasing services	16	106	0.40	641,322	0.57	0.71
541	Professional, scientific & tech	129	632	2.41	7,046,205	6.27	0.38
551	Management of companies &	10	663	2.52	2,913,798	2.59	0.97
561	Administrative & support serv	63	749.5	2.85	7,998,637	7.12	0.40
562	Waste management & remedia	1	39.5	0.15	300,580	0.27	0.56
611	Educational services	10	61	0.23	2,701,675	2.40	0.10
621	Ambulatory health care servic	129	1049	3.99	4,917,156	4.37	0.91
622	Hospitals	1	1749.5	6.66	5,121,584	4.56	1.46
623	Nursing & residential care fac	9	589	2.24	2,770,665	2.46	0.91

Table 12. Continued.

Code	Industry	Establishments	Putnam Employment (Midpoint)	% Total	US Employment	% Total	LQ
624	Social assistance	38	374.5	1.43	2,090,743	1.86	0.77
711	Performing arts, spectator spor	4	5	0.02	370,329	0.33	0.06
713	Amusement, gambling & recre	18	121	0.46	1,314,539	1.17	0.39
721	Accommodation	19	260	0.99	1,696,701	1.51	0.66
722	Food services & drinking plac	109	2481	9.45	8,352,174	7.43	1.27
811	Repair & maintenance	57	270	1.03	1,334,875	1.19	0.87
812	Personal & laundry services	50	310	1.18	1,314,320	1.17	1.01
813	Religious, grantmaking, civic,	85	584	2.22	2,770,892	2.47	0.90
	Total:	1680	26266.5	100.00			
	US Total Employment:				112,400,654	100.00	

Source: US Census Bureau: 2002 County Business Patterns

Table 13. 1998-2002 Putnam Change in Establishments, Employment, LQ

Code	Industry	Establishments			Employment			LQ		
		1998	2002	% Change	1998	2002	% Change	1998	2002	% Change
113	Forestry and logging	5	6	20.00	9.5	39.5	315.79	0.45	2.23	391.80
115	Agriculture & forestry suppor	2	1	-50.00	9.5	9.5	0.00	0.41	0.42	3.84
212	Mining (except oil & gas)	3	4	33.33	39.5	45	13.92	0.70	0.99	40.85
213	Mining support activities	1			9.5			0.22		
221	Utilities	3	3	0.00	50	39.5	-21.00	0.29	0.26	-11.42
233	Building, developing & gener	46	43	-6.52	261	298	14.18	0.73	0.80	10.02
234	Heavy construction	16	14	-12.50	309	259	-16.18	1.54	1.29	-16.16
235	Special trade contractors	75	70	-6.67	639	741	15.96	0.72	0.82	13.80
311	Food mfg	6	6	0.00	1749.5	1749.5	0.00	4.80	5.19	8.07
312	Beverage & tobacco product	1	1	0.00	9.5	39.5	315.79	0.22	1.03	368.77
314	Textile product mills	1	2	100.00	9.5	39.5	315.79	0.06	0.89	1463.28
315	Apparel manufacturing	6	1	-83.33	770	39.5	-94.87	5.33	0.48	-90.95
321	Wood product mfg	16	15	-6.25	422	285	-32.46	2.98	2.28	-23.48
322	Paper mfg	3	2	-33.33	174.5	39.5	-77.36	0.83	0.34	-58.91
323	Printing & related support act	7	7	0.00	31	15	-51.61	0.15	0.09	-38.33
324	Petroleum & coal products m	1			39.5			1.43		
325	Chemical mfg	2	1	-50.00	39.5	39.5	0.00	0.18	0.20	15.99
326	Plastics & rubber products m	10	10	0.00	292	369	26.37	1.14	1.71	49.89
327	Nonmetallic mineral product	1	1	0.00	39.5	9.5	-75.95	0.31	0.09	-72.61
331	Primary metal mfg	3	2	-33.33	102	39.5	-61.27	0.67	0.34	-49.34
332	Fabricated metal product mfg	30	25	-16.67	899	878	-2.34	1.99	2.37	19.44
333	Machinery mfg	15	18	20.00	767	1172	52.80	2.13	4.30	101.65
334	Computer & electronic produ	3	1	-66.67	174.5	39.5	-77.36	0.42	0.13	-68.83
335	Electrical equip, appliance &	4	2	-50.00	9.5	9.5	0.00	0.06	0.08	27.76
336	Transportation equipment mfg	8	6	-25.00	2010	1284	-36.12	4.22	3.48	-17.59
337	Furniture & related product m	14	10	-28.57	291	228	-21.65	1.94	1.70	-12.35
339	Miscellaneous mfg	12	10	-16.67	565	280	-50.44	3.08	1.80	-41.42

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Table 13. Continued.

Code	Industry	Establishments			Employment			LQ		
		1998	2002	% Change	1998	2002	% Change	1998	2002	% Change
421	Wholesale trade, durable goo	60	56	-6.67	460	431	-6.30	0.53	0.54	0.50
422	Wholesale trade, nondurable	37	31	-16.22	652	550	-15.64	1.08	0.97	-10.05
441	Motor vehicle & parts dealers	48	41	-14.58	532	533	0.19	1.22	1.21	-0.80
442	Furniture & home furnishing	27	19	-29.63	152	123	-19.08	1.20	0.95	-20.32
443	Electronics & appliance store	17	12	-29.41	131	82	-37.40	1.45	0.84	-42.36
444	Bldg material & garden equip	31	40	29.03	390	495	26.92	1.38	1.67	20.38
445	Food & beverage stores	28	31	10.71	639	543	-15.02	0.87	0.81	-7.59
446	Health & personal care stores	24	28	16.67	153	227	48.37	0.65	0.98	50.39
447	Gasoline stations	56	59	5.36	375	485	29.33	1.59	2.32	45.56
448	Clothing & clothing accessori	43	38	-11.63	370	309	-16.49	1.16	0.94	-19.14
451	Sporting goods, hobby, book	24	28	16.67	111	161	45.05	0.77	1.12	45.05
452	General merchandise stores	13	15	15.38	784	933	19.01	1.27	1.57	23.47
453	Miscellaneous store retailers	45	40	-11.11	256	316	23.44	1.29	1.64	27.19
454	Nonstore retailers	19	16	-15.79	157	132	-15.92	1.22	1.08	-11.87
481	Air transportation	1			39.5			0.28		
484	Truck transportation	31	35	12.90	966	1749.5	81.11	2.92	5.61	92.06
485	Transit & ground passenger t	2	2	0.00	9.5	9.5	0.00	0.11	0.10	-3.90
488	Transportation support activit	2	1	-50.00	9.5	9.5	0.00	0.09	0.09	-5.49
492	Couriers & messengers	2	5	150.00	39.5	39.5	0.00	0.29	0.36	20.91
493	Warehousing & storage	4	1	-75.00	2	9.5	375.00	0.07	0.07	9.31
511	Publishing industries	5	1	-80.00	39.5	9.5	-75.95	0.16	0.27	73.42
512	Motion picture & sound recor	4	2	-50.00	39.5	39.5	0.00	0.56	0.17	-70.57
513	Broadcasting & telecommuni	11	22	100.00	210	280	33.33	0.58	0.71	22.35
514	Information & data processing	1	4	300.00	39.5	39.5	0.00	0.41	0.31	-23.65
522	Credit intermediation & relate	51	61	19.61	409	412	0.73	0.61	0.59	-4.02
523	Security, commodity contract	8	11	37.50	39.5	39.5	0.00	0.22	0.17	-23.51
524	Insurance carriers & related a	32	31	-3.13	174.5	174.5	0.00	0.30	0.32	5.20
531	Real estate	40	41	2.50	106	103	-2.83	0.36	0.33	-8.30
532	Rental & leasing services	15	16	6.67	85	106	24.71	0.58	0.71	22.78
541	Professional, scientific & tech	115	129	12.17	619	632	2.10	0.41	0.38	-6.57
551	Management of companies &	5	10	100.00	374.5	663	77.04	0.56	0.97	75.04
561	Administrative & support ser	69	63	-8.70	1749.5	749.5	-57.16	0.94	0.40	-57.27

Table 13. Continued.

Code	Industry	Establishments			Employment			LQ		
		1998	2002	% Change	1998	2002	% Change	1998	2002	% Change
562	Waste management & remedi	1	1	0.00	9.5	39.5	315.79	0.13	0.56	323.60
611	Educational services	8	10	25.00	53	61	15.09	0.09	0.10	5.48
621	Ambulatory health care servic	112	129	15.18	939	1049	11.71	0.84	0.91	8.50
622	Hospitals	1	1	0.00	1749.5	1749.5	0.00	1.40	1.46	4.26
623	Nursing & residential care fac	10	9	-10.00	485	589	21.44	0.78	0.91	17.28
624	Social assistance	29	38	31.03	174.5	374.5	114.61	0.40		-100.00
711	Performing arts, spectator spc	3	4	33.33	3	5	66.67	0.04	0.06	49.64
713	Amusement, gambling & recr	15	18	20.00	87	121	39.08	0.30	0.39	32.48
721	Accommodation	16	19	18.75	293	260	-11.26	0.69	0.66	-4.82
722	Food services & drinking plac	118	109	-7.63	2326	2481	6.66	1.20	1.27	5.57
811	Repair & maintenance	67	57	-14.93	263	270	2.66	0.81	0.87	6.76
812	Personal & laundry services	44	50	13.64	256	310	21.09	0.82	1.01	22.45
813	Religious, grantmaking, civic	75	85	13.33	447	584	30.65	0.72	0.90	24.97

Source: US Census Bureau: 1998, 2002 County Business Patterns

Table 14. Target Region 3-Digit Industries Satisfying All Four Quantitative Criteria, 2002

Code	Industry	Establishments	Target Region Employment	% Total	US Employment	% Total	LQ
331	Primary metal mfg	2	384	3.71	501,038	0.45	8.33
336	Transportation equipment mfg	6	923.5	8.93	1,578,707	1.40	6.36
339	Miscellaneous mfg	4	349	3.37	664,710	0.59	5.71
326	Plastics & rubber products mfg	3	374.5	3.62	925,607	0.82	4.40
623	Nursing & residential care fac	6	737.5	7.13	2,770,665	2.46	2.89
444	Bldg material & garden equip	32	267.5	2.59	1,270,736	1.13	2.29
445	Food & beverage stores	35	513.5	4.97	2,883,997	2.57	1.94

Source: US Census Bureau: 2002 County Business Patterns

Table 15. Target Region 6-Digit Industries for Quantitative Screening Results, 2002

Code	Industry	Employees (Midpoint)	% Total	Establishments	US Employment	LQ
326150	Foam product (exc polystyrene) mfg	39.5	0.38	1	33,653	12.76
326199	All other plastics product mfg	174.5	1.69	1	460,386	4.12
326211	Tire mfg (exc retreading)	9.5	0.09	1	60,905	1.70
	Sector Total:	*223.5*		*3*		
331316	Aluminum extruded product mfg	374.5	3.62	1	25,005	162.79
331524	Aluminum foundries (except die-casting)	9.5	0.09	1	28,391	3.64
	Sector Total:	*384*		*2*		
336312	Gasoline engine & engine parts mfg	374.5	3.62	1	65,996	61.68
336360	Motor vehicle seating & interior trim mfg	384	3.71	2	47,931	87.08
336370	Motor vehicle metal stamping	39.5	0.38	1	111,908	3.84
336399	All other motor vehicle parts mfg	184	1.78	2	155,355	12.87
	Sector Total:	*982*		*6*		
339932	Game, toy & children's vehicle mfg	9.5	0.09	1	18,300	5.64
339991	Gasket, packing & sealing device mfg	349	3.37	2	35,092	108.10
339999	All other miscellaneous mfg	9.5	0.09	1	64,544	1.60
	Sector Total:	*368*		*4*		
444110	Home centers	49	0.47	3	416,450	1.28
444120	Paint & wallpaper stores	19	0.18	2	45,339	4.55
444130	Hardware stores	68	0.66	6	140,075	5.28
444190	Other building material dealers	45	0.44	8	489,698	1.00
444210	Outdoor power equipment stores	39.5	0.38	2	27,775	15.46
444220	Nursery & garden centers	100	0.97	11	151,399	7.18
	Sector Total:	*320.5*		*32*		
445110	Grocery (except convenience) stores	498.5	4.82	24	2,387,828	2.27
445120	Convenience stores	38	0.37	5	181,523	2.28
445310	Beer, wine & liquor stores	38	0.37	6	137,801	3.00
	Sector Total:	*574.5*		*35*		
623110	Nursing care facilities	737.5	7.13	6	1,604,222	5.00
	Sector Total:	*737.5*		*6*		
	Target Total:	10341		884		
					US Total: 112,400,654	

Source: US Census Bureau: 2002 County Business Patterns

Table 16. Putnam 3-Digit Industries Satisfying All Four Quantitative Criteria, 2002

Code	Industry	Establishments	Putnam Employment (Midpoint)	% Total	US Employment	% Total	LQ
484	Truck transportation	35	1749.5	6.66	1,333,342	1.19	5.61
311	Food mfg	6	1749.5	6.66	1,443,766	1.28	5.19
333	Machinery mfg	18	1172	4.46	1,166,221	1.04	4.30
452	General merchandise sto	15	933	3.35	2,546,094	2.27	1.57
			US Total Employment:		*112,400,654*	*5.78*	

Source: US Census Bureau: 2002 County Business Patterns

Table 17. Putnam 6-Digit Industries for Quantitative Screening Results, 2002

Code	Industry	Putnam Employment (Midpoint)	% Total	Establishments	US Employmen	LQ
311330	Confectionery mfg from purchased chocolate	749.5	2.85	1	33,429	95.94
311611	Animal (except poultry) slaughtering	9.5	0.04	1	148,551	0.27
311612	Meat processed from carcasses	9.5	0.04	1	100,273	0.41
311615	Poultry processing	1749.5	6.66	1	237,813	31.48
311811	Retail bakeries	9.5	0.04	1	54,723	0.74
311942	Spice & extract mfg	9.5	0.04	1	13,445	3.02
	Sector Total:	*2537*		*6*		
333111	Farm machinery & equipment mfg	39.5	0.15	1	55,742	3.03
333295	Semiconductor machinery mfg	9.5	0.04	1	30,445	1.34
333311	Automatic vending machine mfg	9.5	0.04	1	6,853	5.93
333313	Office machinery mfg	374.5	1.43	1	16,602	96.53
333319	Oth commercial, service industry machinery m	39.5	0.15	1	50,969	3.32
333414	Heating equipment (exc warm air furnaces) mf	39.5	0.15	2	21,484	7.87
333415	AC, warm air htg & commercial refrig equip m	374.5	1.43	1	110,459	14.51
333512	Machine tool (metal cutting types) mfg	39.5	0.15	1	19,820	8.53
333514	Special die, tool, die set, jig & fixture mfg	39.5	0.15	4	19,820	8.53
333912	Air & gas compressor mfg	9.5	0.04	1	19,823	2.05
333995	Fluid power cylinder & actuator mfg	9.5	0.04	1	20,765	1.96
333999	All other general purpose machinery mfg	39.5	0.15	3	54,828	3.08
	Sector Total:	*1024*		*18*		
452110	Department stores	174.5	0.66	2	1,742,136	0.43
452910	Warehouse clubs & superstores	749.5	2.85	1	497,947	6.44
452990	All other general merchandise stores	174.5	0.66	12	306,011	2.44
453110	Florists	23	0.09	5	119,117	0.83
453210	Office supplies & stationery stores	52	0.20	5	125,670	1.77
453220	Gift, novelty & souvenir stores	23	0.09	5	209,064	0.47
	Sector Total:	*1196.5*		*30*		
484122	General freight trucking, long-distance, LTL	940.5	3.58	23	253,454	15.88
484210	Used household & office goods moving	9.5	0.04	1	114,558	0.35
484230	Specialized freight (exc used) trucking, LDist	71.5	0.27	11	147,136	2.08
	Sector Total:	*1021.5*		*35*		
	US Total:				112,400,654	

Source: US Census Bureau: 2002 County Business Patterns

Table 18. Target Region 6-Digit Trends for Industries Satisfying both Quantitative and Qualitative Criteria

Code	Description	Establishments		Target Region Employment			US Employment		
		1998	2002	1998	2002	% Increase	1998	2002	% Increase
331316	Aluminum extruded product mfg	1	1	374.5	374.5	0.00	31,145	25,005	-19.71
331524	Aluminum foundries (except die-casti	1	1	9.5	9.5	0.00	34,270	28,391	-17.15
336312	Gasoline engine & engine parts mfg	1	1	374.5	374.5	0.00	85,618	65,996	-22.92
336360	Motor vehicle seating & interior trim	0	2	0	384	n/a	46,977	47,931	2.03
336370	Motor vehicle metal stamping	0	1	0	39.5	n/a	126,060	111,908	-11.23
336399	All other motor vehicle parts mfg	2	2	374.5	184	-50.87	178,168	155,355	-12.80

Source: US Census Bureau: 1998, 2002 County Business Patterns

Table 19. Putnam County 6-Digit Trends for Industries Satisfying both Quantitative and Qualitative Criteria

Code	Description	Establishments		Putnam Employment			US Employment		
		1998	2002	1998	2002	% Change	1998	2002	% Change
311330	Confectionery mfg from purchased chocol	1	1	1749.5	749.5	-57.16	34,286	33,429	-2.50
311611	Animal (except poultry) slaughtering	1	1	9.5	9.5	0.00	146,305	148,551	1.54
311612	Meat processed from carcasses	1	1	0	9.5		91,138	100,273	10.02
311615	Poultry processing	1	1	1749.5	1749.5	0.00	222,600	237,813	6.83
311811	Retail bakeries	1	1	9.5	9.5	0.00	58,638	54,723	-6.68
311942	Spice & extract mfg	1	1	9.5	9.5	0.00	11,449	13,445	17.43
484122	General freight trucking, long-distance, LT	7	23	843	940.5	11.57	266,270	253,454	-4.81
484210	Used household & office goods moving	2	1	59.5	9.5	-84.03	124,045	114,558	-7.65
484230	Specialized freight (exc used) trucking, LI	2	11	9.5	71.5	652.63	167,899	147,136	-12.37

Source: US Census Bureau: 1998, 2002 County Business Patterns

Table 20. NAICS 484: Truck Transportation Firm Information; Target Region, Putnam County; 2005

Name	City	County
Buford Trucking Inc	Celina	Clay
Happy Trucking Co	Moss	Clay
Birdwell Farms Trucking Inc	Gainesboro	Jackson
Chaffin Trucking	Gainesboro	Jackson
Baha Transport LLC	Livingston	Overton
Beason & Son Trucking	Livingston	Overton
Central Florida Enterprises	Livingston	Overton
Copeland Trucking Inc	Livingston	Overton
Denny Spears Trucking	Livingston	Overton
J&M Trucking & Repairs	Livingston	Overton
Smith Trucking	Livingston	Overton
T&I Trucking	Livingston	Overton
Walthall Trucking	Livingston	Overton
RCI Leasing	Byrdstown	Pickett
Triple M Transport	Byrdstown	Pickett
ABF Freight System Inc	Cookeville	Putnam
Abram's Lite Hauling	Monterey	Putnam
Averitt Express Inc	Cookeville	Putnam
Central Transport Inc	Cookeville	Putnam
Charles Baily Trucking	Cookeville	Putnam
Expedited Transport Assoc, Inc	Cookeville	Putnam
Roadway Express, Inc	Cookville	Putnam
S&L Enterprises	Cookeville	Putnam
Songbird Enterprise, Inc	Cookeville	Putnam
T&L Transportation	Cookeville	Putnam
Tennessee Western Express	Cookeville	Putnam
Yellow Tansportation	Cookeville	Putnam

Source: Yellow Pages

Table 21. NAICS 336: Transportation Equipment Manufacturing; Target Region, Putnam County, 2003

Name	County	SIC	Product	Employees
Veltri Metal Products, Inc	Clay	3465	Automotive Stampings and Air Bags Components	70
Crotty-Tennessee	Clay	3714	Automotive Sunvisors	160
Crotty-Tennessee	Jackson	3714	Automotive Sunvisors	245
Hutchison FTS Ins	Overton	3585	Automotive Air Conditions Components	375
Wood-Tech inc	Putnam	2499	Custom Van Interior Accessories	28
Cassemco Inc	Putnam	3069	Automotive Interior Trim	30
Delbar Products Inc	Putnam	3231	Rearview Truck Mirrors	120
AllTrista Thermoformed Produc	Putnam	3714	Plastic Automotive Parts	100
Dacco Inc	Putnam	3714	Automotive Automatic Transmission Parts	475
TRW Automotive	Putnam	3714	Automobile Air Bags	600

Source: 2003 Harris Directory of Manufacturing

Table 22. NAICS 311: Food Manufacturing; Putnam County; 2003

Name	SIC	Product	Employees
Dyers Slaughter House	2011	Meat Processing	3
Gaw & Thompson Meat Processing	2013	Meat Processing	5
James Meat Co, Inc	2013	Meat Slaughtering, Processing, Packaging	6
Purdue Farms Inc	2015	Poultry Processing & Packaging	2200
ARC	2051	Cooking Oil, Baked Goods	150
Big O's Donuts	2051	Donuts	12
Russell Stover Candies, Inc	2066	Manufactures Chocolate Candy	1200
Advocacy & Resources Corp	2099	Dried Baking Products	106
King Salad and Produce, Inc	2099	Pre-Packaged Salads	3

Source: 2003 Harris Directory of Manufacturing

Table 23. NAICS 332: Fabricated Metal Manufacturing; Putnam County, 2003

Name	Product	County	SIC	Employees
LWP Inc	Assemble and Fabricate Screw Driver	Clay	3999	28
Multi Lock Inc	Security Locks	Fentress	3429	3
Micro Metals Inc	Powdered Metal Componenets	Fentress	3399	110
Triple D Machine Shop	Machine Shop	Fentress	3599	3
Eaton Corporation	Hydraulic Fittings	Jackson	3429	100
Conco Metal Roofing	Metal Roof Fabrication	Overton	3444	4
WW Manufacturing	Cattle handinling Equipment	Overton	3523	35
Progressive Engineering Inc	Tool And dies	Overton	3544	15
DA-LO Industries, Inc	Sheet and ornamental metal fabrication	Pickett	3446	20
Putnam Metal Products	Metal Roofing	Putnam	2952	6
Harris Metals Co LLC	Aluminum castings	Putnam	3365	50
QMT Quality Metal Treating	Metal heat treating services	Putnam	3398	5
Stone Brothers	Structural Steel Fabrication	Putnam	3441	17
HH Compro Inc	Aluminum Fabricating	Putnam	3444	18
Metcom Inc	Sheet metal fabrication	Putnam	3444	100
Doyle Choate Welding Shop	Ornatmental Iron fabrication	Putnam	3446	4
Security Fence inc	Gates, Fencing, & components	Putnam	3446	8
Apcom Inc	Metal Stampings	Putnam	3469	70
Cookeville Tool & Mfg Co, Inc	Metal Stampings	Putnam	3469	65
Genco Stamping & Manufacturing	Metal Stampings	Putnam	3469	108
Progressive Die & Stampings	Metal Stampings	Putnam	3469	13
Cookeville Plating Co, Inc	Decorative chrome Plating	Putnam	3471	9
dixie-Imperial Plating Co, Inc	Decorative plating services	Putnam	3471	10
Bradmark Industrial Coatings	Metal Stampings	Putnam	3479	20
Cookeville Metal Enterprises	Custom metal fabrication	Putnam	3479	8
Mid South Machine and Supply	Metal Valves	Putnam	3494	25
G&L Manufacturing Inc	Stainless tubes	Putnam	3498	25
PLM Group	Farm Machinery	Putnam	3523	6
Maberry Tool & Cutter Services	Cutting tools for metal removal	Putnam	3541	6
Custom Tool Inc	Tooling, metal fabrication	Putnam	3544	11
George A Mitchell Mfg Co	Tool and dies	Putnam	3544	20

Table 23. Continued.

Name	Product	County	SIC	Employees
Suburban Tool Co	Precision Replacement tooling	Putnam	3545	6
Baron USA, Inc	Machines for oil purification	Putnam	3569	17
Flowservice Corp	Valves	Putnam	3593	400
Alloy Metals and Products, Inc	Machine shop, sheet metal	Putnam	3599	7
Flexial Corp	Metal Bellows	Putnam	3599	45
G&G Stamping & Fabrication	Machine shop, metal stamping	Putnam	3599	12
Leonard Machine Co	Machine shop	Putnam	3599	15
Mason's Tool and Machine Shop	Machine Shop	Putnam	3599	1
Millers Engine Machine and Parts	Machine Shop	Putnam	3599	4
Motor Works Machine Shop	Machine Shop	Putnam	3599	4
Nick's Drive Lan'es & Machines	Machining	Putnam	3599	2
Precision Tool & Manufacturing	Machine Shop	Putnam	3599	6
T&S Automotive Shop	Machine Shop	Putnam	3599	1
V&J Machine	General Machining	Putnam	3599	5
Mill Creek Machine Works	Machine shop	Putnam	3599	7
Mid-State Motor Works	Machine Shop	Putnam	3621	2
Lucky B Manufacturing	Steel trailer roof bows	Putnam	3799	21

Source: 2003 Harris Directory of Manufacturing

Table 24. NAICS 331: Primary Metal Manufacturing; Target Region, 2003

Name	County	SIC	Product	Employees
Neilson & Bainbridge LLC	Jackson	3499	Aluminum Picture Frames	300
BR Metal Products	Overton	3325	Steel Foundry	20

Source: 2003 Harris Directory of Manufacturing

Table 25. US Employment Change for Selected Clusters 1998 to 2002

Code	Industry	% Change in Employment
484	Truck Transportation	0.47
311	Food Manufacturing	-1.41
332	Fabricated Metal Manufacturing	-12.87
336	Transportation Equipment Manufacturing	-17.40
331	Primary Metal Manufacturing	-18.55

Source: US Census Bureau: 1998, 2002 County Business Patterns

Table 26. Average US Hourly Wages and Annual Income for Selected Clusters 2003

Code	Industry	Average Hourly Wage	Average Annual Income
336	Transportation Equipment Manufacturing	$21.22	$45,390
331	Primary Metal Manufacturing	$18.11	$37,680
332	Fabricated Metal Manufacturing	$17.16	$35,680
484	Truck Transportation	$17.06	$35,520
311	Food Manufacturing	$13.81	$28,720

Source: US Bureau of Labor Statistics: Wage Statistics

Table 27. Income Multipliers for Selected Clusters, 2000

Code	Industry	Multiplier
311	Food Manufacturing	1.60
336	Transportation Equipment Manufacturing	1.53
331	Primary Metal Manufacturing	1.45
332	Fabricated Metal Manufacturing	1.44

Source: IMPLAN 2000

Table 28. Average Establishment Size for Selected Clusters, 1997

Code	Industry	Average Number of Employees
336	Transportation Equipment Manufacturing:	142
331	Primary Metal Manufacturing:	120
311	Food Manufacturing:	56
332	Fabricated Metal Manufacturing:	28
484	Truck Transportation	12

Source: US Census Bureau: 1997 Economic Census

Table 29. Revenue per Worker for Selected Clusters, 1997

Code	Industry	Revenue per worker ($)
336	Transportation Equipment Manufacturing:	309,419
311	Food Manufacturing:	288,215
331	Primary Metal Manufacturing:	278,216
332	Fabricated Metal Manufacturing:	137,055
484	Truck Transportation	109,156

Source: US Census Bureau: 1997 Economic Census

Table 30. Presence of Selected Clusters in the Target Region and Putnam, 2002

			Target Region			Putnam			Combined		
Code	Industry	Cluster Location	Est.	Emp.	LQ	Est.	Emp.	LQ	Est.	Emp.	LQ
311	Food Manufacturing	Putnam	0	0	0	6	1749.5	5.19	6	1749.5	3.72
331	Primary Metal Manufacturing	Target Region	2	384	8.33	2	39.5	0.34	4	423.50	2.60
332	Fabricated Metal Manufacturi	Putnam	11	242.5	1.67	25	878	2.37	36	1120.50	2.17
336	Transportation Equipment Ma	Target Region/Putnam	6	923.5	6.36	6	1284	3.48	12	2207.50	4.29
484	Truck Transportation	Putnam	23	79	0.64	35	1749.5	5.61	58	1828.50	4.21

Source: US Census Bureau: 1998, 2002 County Business Patterns

Table 31. Standardized Values for Selected Cluster Characteristics

| Code	Industry	Employment Growth	Wages	Multipliers	Establishment Size	Revenue	Sum of Indices
336	Transportation Equipment Manu	-0.83	1.41	0.41	1.24	0.91	3.13
311	Food Manufacturing	0.96	-1.38	1.32	-0.27	0.68	1.30
331	Primary Metal Manufacturing	-0.96	0.24	-0.65	0.85	0.57	0.05
484	Truck Transportation	1.17	-0.15	0.00	-1.05	-1.23	-1.26
332	Fabricated Metal Manufacturing	-0.33	-0.12	-0.83	-0.76	-0.93	-2.97
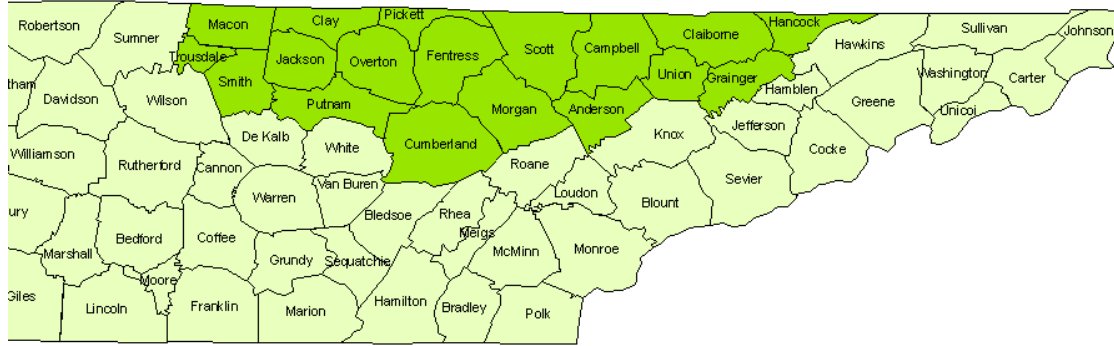
Figure 1. Upper-Cumberland Counties
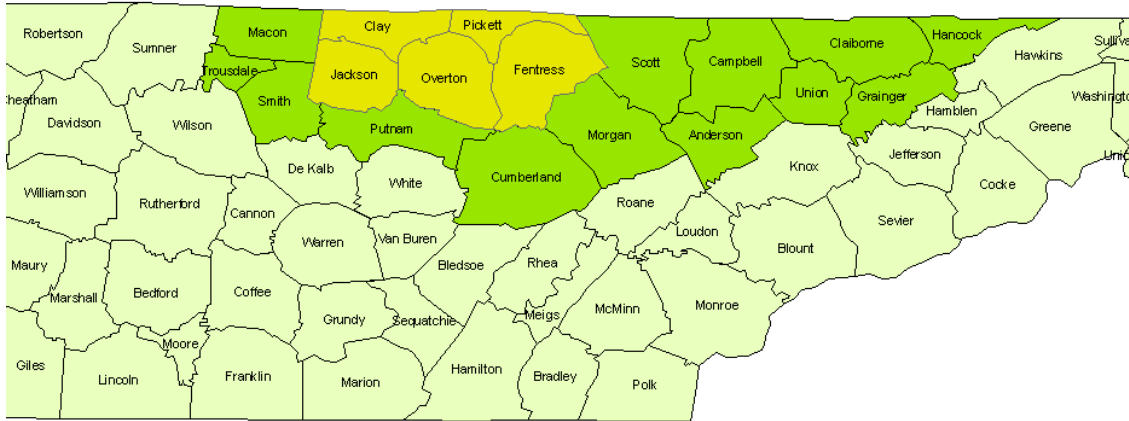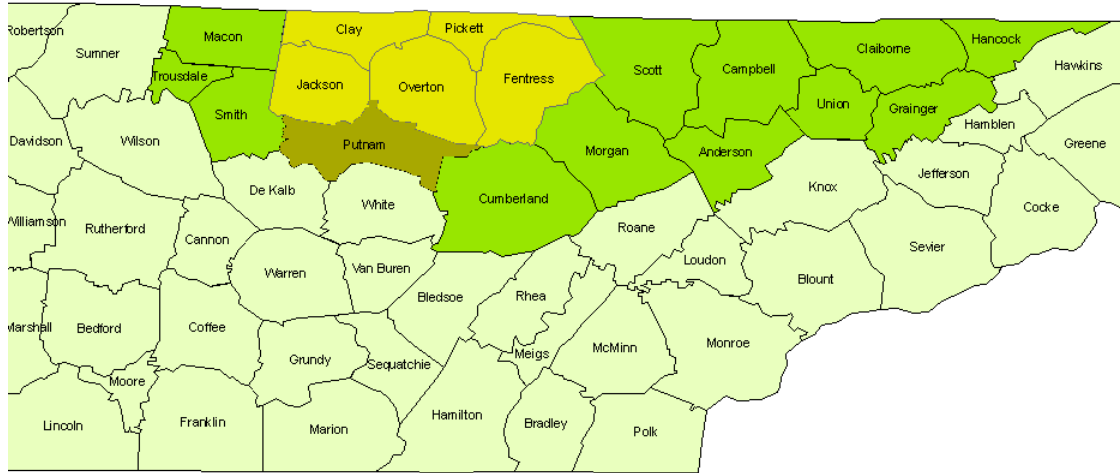
Figure 2. Target Region

Figure 3. Target Region and Putnam County

Vita

Benjamin Paul Sanders was raised in Bradley County, Tennessee. He attended the McCallie School, earning a high school diploma in 1999. From there, he went to the University of Tennessee, earning a B.S. in Animal Science in 2003 and completing an M.S. in Agricultural Economics in 2005.