

Deloitte Consulting & Cleveland State University

**Industry-Based Competitive
Strategies for Ohio:
Managing Three Portfolios**

Economic Development Strategies That Build From
Current Strengths and Address Competitive
Challenges

Submitted to

The Ohio Department of Development

and

Techsolve

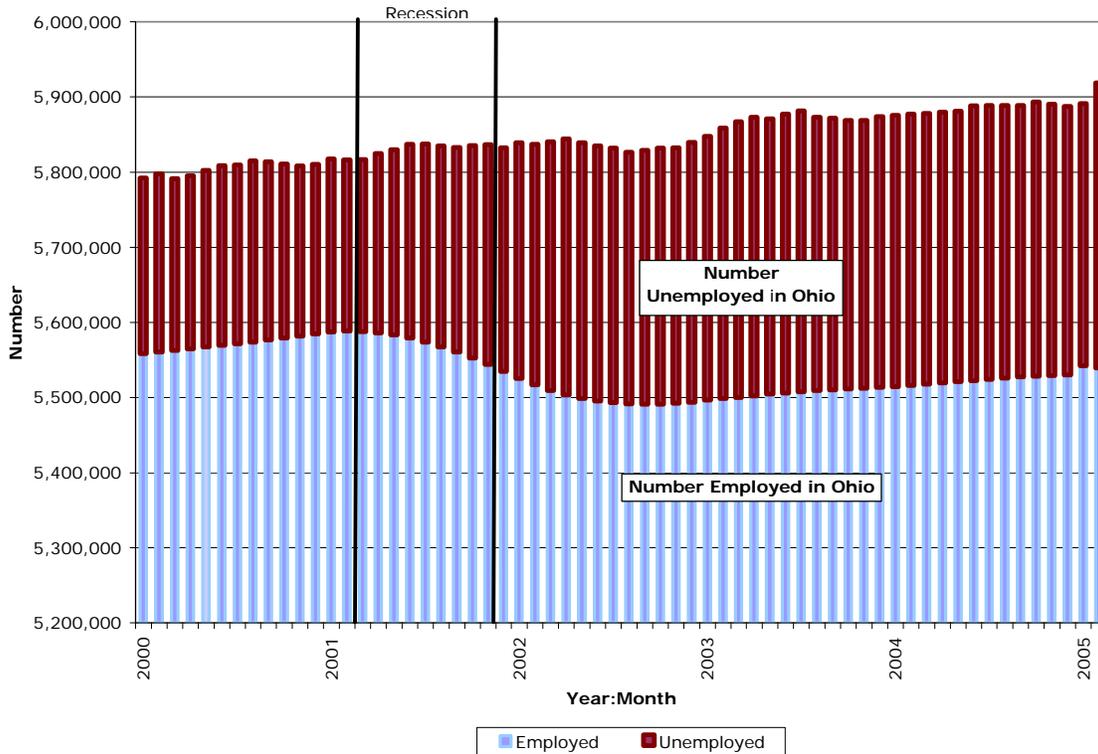
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SECTION 1

EXECUTIVE SUMMARY

The recession of 2001 hit Ohio disproportionately hard. Ohio slid into recession before the nation as a whole and stayed there longer, with recovery only becoming apparent in the labor market in 2003. Since that time, employment growth has remained sluggish.



Source: U.S. Bureau of Labor Statistics, Current Employment Survey, May 2005

Incomes have begun to recover. Ohio experienced a 9.5% increase in per capita income between 2001 and 2004, with most of that growth taking place in 2003. This growth rate is above the national average of 7.7% and is above the average for the Great Lakes states. However, this growth in per capita income has not been enough to regain the losses in momentum experienced during the recession. Ohio's per capita income remains \$1,600 per person below the national average and ranks 28th among the states and Washington, D.C.

Political and business leaders have recognized a need to chart a new economic course for Ohio's future. In fall 2004, the Ohio Department of Development charged a team of Deloitte Consulting and Cleveland State University researchers and analysts with examining the state's economy, exploring core strengths and weaknesses, determining current and future challenges, highlighting potential growth opportunities, and crafting strategies for making Ohio an attractive and competitive place to do business.

This study represents a step toward determining effective uses for limited development dollars in the state and filling in Ohio's economic development strategy. This statewide

industry study has been designed to provide economic development officials with insight, analysis, and strategic tools to help businesses compete more efficiently in an increasingly global marketplace.

The task ahead is to draw on the state's history of innovation to develop creative, cohesive, and useful business strategies for promoting and retaining the state's mature core industries while attracting and nurturing new industries and investment. This study attempts to alert the state to emerging opportunities and suggest policies that will be nimble enough to respond to growth markets and today's fast-paced business environment.

STUDY APPROACH

Findings and recommendations for this study have emerged from objective statistical analysis and "real world" understanding: They incorporate assessment tools, the filters of professional experience, insight gleaned from expert panels of industry leaders throughout the state, and guidance from an advisory panel on best practices.

The study's primary objective has been to identify the industries that are at the heart of Ohio's current competitive advantage and to determine growth opportunities and emerging technologies that hold potential for significant economic benefit to the state and its regions.

The industry-based competitive strategies detailed in this report:

- Highlight the portfolio nature of the state's economy and suggest steps to better support Ohio's mix of regions, industries, and technologies.
- Designate key industry sectors that are drivers of state and regional economies.
- Identify growth opportunities and emerging technologies.

This study begins with a current snapshot of Ohio's economy. The study team has relied on third-party data from Economy.com, IMPLAN, and other sources to provide an objective, statistical look at industries in Ohio and determine which ones form the core of the state's economy.

The statistical model for this analysis incorporated 12 variables to evaluate each industry sector in the state for its productivity and its location quotient, which is a designation of how highly specialized the industry is in Ohio compared to other areas in the nation. This study is heavily weighted toward productivity, which is a reflection of current economic reality. Modern technology allows companies to do more with fewer workers. Today's globally competitive environment forces companies to become more productive simply to survive. More traditional measures, such as employments levels, tell one chapter of Ohio's economy but certainly not the entire story. Quite simply, the state must encourage companies to innovate and adopt technology to be more productive and competitive. In the end, improved productivity is what ultimately will return jobs to Ohio.

To get a clear understanding of the state's competitive business environment, the study team has explored Ohio's economy from the top down and the bottom up. A high-level macroeconomic analysis examined Ohio's economic status and performance, relevant global and national sector trends, and the economic development situation in Ohio. From the microeconomic view, the study team determined industries that formed the core of state and regional economies and the cluster industries that support them. A cluster

simply refers to an industry's supply chain backward and forward, suppliers to consumers.

Next, the study team looked at how Ohio stacks up against competitors. Focusing on target industries and specific functions within those industries, the team compared strengths and weaknesses of Ohio, as well as of particular regions and metropolitan areas, to other states vying for the same types of industries. The statistical model highlighted the industries in which Ohio had a competitive advantage. To complement this benchmarking effort, the study team gathered qualitative data by surveying industry leaders within Ohio and outside the state, venture capitalists, site selectors, and economic development officials to provide "in the trenches" details beyond statistical findings.

This assessment allowed the team to identify issues and gaps that hindered Ohio in its ability to support the identified driver industries and emerging opportunities. Specifically, the team has been able to identify factors limiting Ohio's competitiveness as a location for business retention, expansion, and attraction across multiple dimensions and to highlight key business issues that driver and emerging industries face.

The final phase of this study focused on implementation. It's not good enough simply to know what Ohio is good at now and how its business environment stacks up against competitors. The strength of this study is that, by working with ODOD officials and an advisory committee, the team has developed specific recommendations to help chart Ohio's future economic success. These recommendations provide direction to economic development strategy for increasing Ohio's ability to grow, retain, and attract targeted industries and functions and address factors that impede its competitiveness.

A FEW KEY FINDINGS

- Ohio is a portfolio economy. No one industry, or handful of industries, dominates the state's varied economic landscape. That diversity of industry is good for economic stability but makes crafting public policies and development strategies a challenge.
- Ohio's economy is actually made up of several distinct regional economies. Based on history, demographics and commuting patterns, the team divided the state into six regions: Northeast, Northwest, Central, West Central, Southeast, and Southwest. Each region has its own mix of driver industries and its own economic personality and portfolio.
- The statistical model identified 17 driver industries for Ohio. Only one – motor vehicle parts manufacturing – was a driver in all six regions.
- Improving Ohio's economy requires managing not just one portfolio but three: regions, industries, and technologies.
- Ohio appears to be an attractive environment for banks, corporate and divisional headquarters, and insurance carriers.
- Ohio industries are continuing to innovate and incorporate new technologies to improve their productivity. For some, these are largely labor-saving measures, but other companies are embracing technology as growth opportunities.
- Manufacturing continues to be the state's largest employer – despite absorbing the bulk of the job losses related to the 2001 recession. This sector's obvious importance to the economy is contrasted by a general feeling of limited support and lack of respect among Ohio's businesses.

- Small and midsized manufacturers in the state feel under constant pressure to keep their prices low and absorb increases in material, energy, and compliance costs. They feel assaulted by what they see as the unfair trade of global competition. Most admit to being so overwhelmed with simply surviving and keeping pace with the rapidly changing business environment that they have little time or resources to chart a growth strategy.
- Ohio industries are concerned about the state continuing to provide a fertile environment for business. In particular, they worry about issues of workforce commitment and skill level, an outdated tax structure that they see as a disincentive for growth, health care and benefit costs that continue to soar, and the daunting threat of legal liabilities.
- Ohio companies, small to large, have reasons to remain loyal to the state. Many admit that the costs and time involved in rebuilding their businesses make them reject offers to relocate outside the state. Others cite the personal pull of family and history.

OHIO'S COMPETITIVE POSITION

This analysis of Ohio's economy details key strengths, weaknesses, opportunities, and threats. Many of these may be opposite sides of the same coin. For example, the state's diverse portfolio of economic drivers among different regions may make it impossible to develop a single state development strategy, but this diversity is, in fact, a strength in much the same way that diversified financial portfolios help protect investors from market setbacks. Ohio companies are increasing productivity, which is a strength, but their investments in automation to improve productivity have resulted in ongoing employment losses (a weakness). Ohio has a strong manufacturing supply chain, but that strength is being continually threatened by increasingly sophisticated offshore competition for commodity manufacturing. The automotive industry, in particular, is struggling in a harsh competitive environment, which threatens the overall state economy because of the auto industry's powerful reach throughout the state's supply chain. Ohio travelers may see the drop in the value of the dollar as a definite threat to their vacation plans, but for the state's challenged manufacturers, it comes as an opportunity.

Other identified strengths include the state's central location, its transportation infrastructure, and its high concentration of workers with industry-specific skills. State weaknesses revolve around population, which has been stagnant and particularly lacking in advanced-degree holders, and perception, particularly the view that Ohio has high business costs due to unions, utilities, and taxes. The state's progress into a 21st century economy also continues to be constricted by "rust belt" connotations from its past. Not only is the state challenged by offshore competition, but it is also falling under "friendly fire," facing increasing threats from aggressive economic development programs in other states.

The challenge to Ohio officials is to seize on opportunities that present themselves – and take proactive steps to make opportunities happen. Developing programs that help existing manufacturers capture a larger share of the value chain would be a step forward in addressing identified weaknesses and threats. Identifying and nurturing growth opportunities and emerging technologies, restructuring public policies to attract and retain business, and targeting a marketing effort at dispelling misperceptions are crucial elements for improving the state's economic environment.

RESTRUCTURED STRATEGIES

The diversity of Ohio's current industrial portfolio is a source of strength for the state but has led to significant strategic gaps. Bridging these gaps calls for innovative thinking in how economic development programs are structured and delivered. For example, economic development programs tend to flow down from the state level. However, many industries in Ohio are more closely linked to regional resources. Closing the gap between industries and the support they need often means leading the execution of services from the regional level. This may be best achieved by empowering regional economic development officials to respond to the particular business environment mix in their areas and providing incentives for local development programs to work together for the good of their region.

The study has identified seven driver industries in which focused development efforts have the best present opportunities for protecting and augmenting Ohio's economic base and facilitating growth in the state. These are:

- Motor vehicle and motor vehicle parts manufacturing
- Chemicals and polymers
- Clinical medicine and related industries
- Logistics, distribution, and warehousing
- Corporate and divisional headquarters, back-office, and administrative functions
- Food processing and manufacturing and agriculture value-added products
- Environmental technology

A handful of other growth opportunities are positioned to reinvigorate existing driver industries or serve as stand-alone engines for future growth. For the purposes of this study, growth opportunities are defined as having a growing market for products, increases in productivity, relative Ohio competitiveness, and ability to capture additional market share. Qualitative assessment from venture capitalists, expert panelists, and study advisers also was incorporated into this effort to identify potential growth industries. Those determined most likely to thrive in Ohio are:

- Nondepository credit intermediation (nonbank)
- Headquarters and administrative services
- Computer systems design and related services
- Scientific research and development services
- Specialized design services
- Electronic and precision equipment repair and maintenance
- Tourism and arts

Through a process similar to determining growth opportunities, the study has also identified the following emerging technologies:

- Polymers, particularly in the areas of:
 - Biocompatible
 - Photonic
 - Electronic
 - Conductive
 - Liquid crystal displays
- Medical equipment and research
- Fuel cells, particularly in the areas of:
 - Heating, ventilation, and air-conditioning

- Automotive
- Electric power generation
- Nanotechnology, particularly in the areas of:
 - Nanomaterials
 - Nanosensing
 - Nanobiological
 - Nanochemical
 - Intersection of polymer technology and nanotechnology
- Information technology, particularly for the:
 - Medical industry
 - Financial service industry
 - Security database and data-mining applications
- Micro-electrical-mechanical systems (MEMS), particularly in the areas of:
 - MEMS machines
 - Automotive

These distinct industry mixes require different economic development strategies and goals. The seven driver industries identified as development opportunities should benefit from a traditional approach to retaining and expanding the state's existing economic base by assisting businesses with individual problems. An attraction strategy for these industries should be focused on providing businesses outside the state with information on Ohio's industrial and workforce strengths, implementing a marketing message promoting the state's array of offerings, and polishing the state's image as a welcoming business environment. The identified growth opportunities and emerging technologies may benefit from these problem-solving and image-enhancing efforts, but they require more – a product development and technology-based strategy focused on developing and attracting entrepreneurial endeavors.

Implementing a cohesive approach to economic development in Ohio requires that state and regional entities collaborate on processes, incentives, and communication of goals and services. Economic development practitioners at the state and regional levels must work together through the stages of implementation to:

- Identify industries and technologies to support
- Prioritize those areas in which development assistance can have optimal effect
- Choose whether the state or regions will take the lead
- Determine how best to support targeted industries and technologies
- Build an action plan

RECOMMENDATIONS

This study sets forth a number of steps the state can take to work toward improving Ohio's economic environment:

- **Shift the state's economic development approach.** The state's economy is a portfolio of industries. No "silver bullet" solution will turn the state's economy around. Therefore, state officials must understand the changing landscape of Ohio's and the world's economy. The first step is assessment: What does the state do well? What industry is in a position to grow? The state's economic development efforts need to proactively target resources toward industries that represent the best opportunities for nurturing growth.
- **Drive change in public policy.** Take care of the basics: resolve tax issues, make incentive programs easier to understand and more accessible, among

other steps. Reward productivity, not simply job creation. Productivity and output are the modern measures of business well being, and state incentive programs need to reflect that. However, the state must understand that the overhauling public policy will not solve the challenges facing Ohio's economy.

- **Cultivate an effective region-state dynamic.** Recognize that the distinct, individual nature of the regional economies requires that solutions be bottom-up. The state's role should be to support and enhance these grassroots responses. Give regions authority to create programs that respond to their unique needs. These programs could be shaped by a strategy framework based on best practices over time and input from researchers, industry leaders, and other regional constituents. State money would follow best practices and encourage regional partnerships among economic development entities. Regional entities, in turn, would be required to match state funding.
- **Strengthen ODOD's industry-specific expertise geared toward region-state management.** Engage in business matchmaking for businesses the state is trying to attract by lining up potential customers. Function as a business accelerator for companies in need of connecting to customers, suppliers, and capital. Tap industry experts to help craft incentive packages and programs that respond to specific needs of individual industries.
- **Develop a marketing message to overcome Ohio's perception problem.** Counter the residual "rust belt" image by promoting state strengths, such as its workforce, its diversity of economic drivers, its broad manufacturing supply chain, and its high concentration of industry-specific skills. Champion not only the overall strengths of the state, but the individual qualities of the regions, as well. Ohio is unusual in having several metropolitan areas with a distinct mix of industries and amenities. This variety should be marketed to Ohio's advantage.
- **Focus on preserving the health of Ohio's automotive industry.** Recognize that Ohio's economy still relies heavily on the well-being of the automotive industry. The automotive industry ripples across many of the state's driver industries. Many Ohio industries are directly part of the automotive supply chain, but countless others are indirectly affected by whether motor vehicle manufacturing is roaring or idling. Develop business strategies for keeping automotive plants and their suppliers in Ohio. The best opportunities may be in the areas of just-in-time delivery and research and development built around facility changes in model design and production processes.
- **Develop a long-term strategy for attracting and growing existing headquarters and divisional offices.** Ohio's strength in headquarters, complemented by its vigor in providing back-office and administrative business functions, represents a growth opportunity.
- **Cultivate growth opportunities and emerging technologies.** Look for emerging industries and technologies that flow from the state's existing industry core. Nurture and facilitate innovation. Innovation has been and continues to be vital to the success of individual businesses and Ohio's economy overall. State programs could be designed to help promote and sustain process improvement, new product development, new categories of product, business strategies, and operating philosophies.
- **Help small and mid-sized companies compete.** Implement programs that help businesses develop strategies for long-term success instead of simply reacting to the current squeeze of global competition and today's accelerated speed of doing business. Consider applying Manufacturing Extension Partnership programs to

broader industries. Act as process innovator intermediaries for small to midsized enterprises. Small businesses, particularly those in mature market industries, need help with new product innovation and implementation of new technologies and processes.

- **Strengthen education within the state to meet industry needs.** Focus on training programs that develop the technical skills modern employers need. The state has strength in workforce training in its community colleges and career technical centers. Subsidize incumbent worker training, particularly those skills linked to driver industries or priority functions. Provide funds for customized training. Align academic and applied technology resources. Make chemistry a priority in secondary schools and at the university level. Chemistry is a cornerstone of Ohio's technological innovation.

As noted earlier, there is no "silver bullet," quick-fix strategy to right Ohio's recent economic foundering. However, the findings and recommendations presented here aim to draw on the state's past innovation and present strengths to provide the navigational tools necessary to chart a course for Ohio's future prosperity.

SECTION 2

INTRODUCTION

In fall 2004, the Ohio Department of Development (ODOD) commissioned a team from Deloitte Consulting and Cleveland State University to study the current status of industry sectors in Ohio; assess industry contribution to the overall state and regional economies; highlight industries poised for growth; and recommend strategies for helping to grow, retain, and attract successful businesses.

The ODOD goals for the information and insight generated from the study are to:

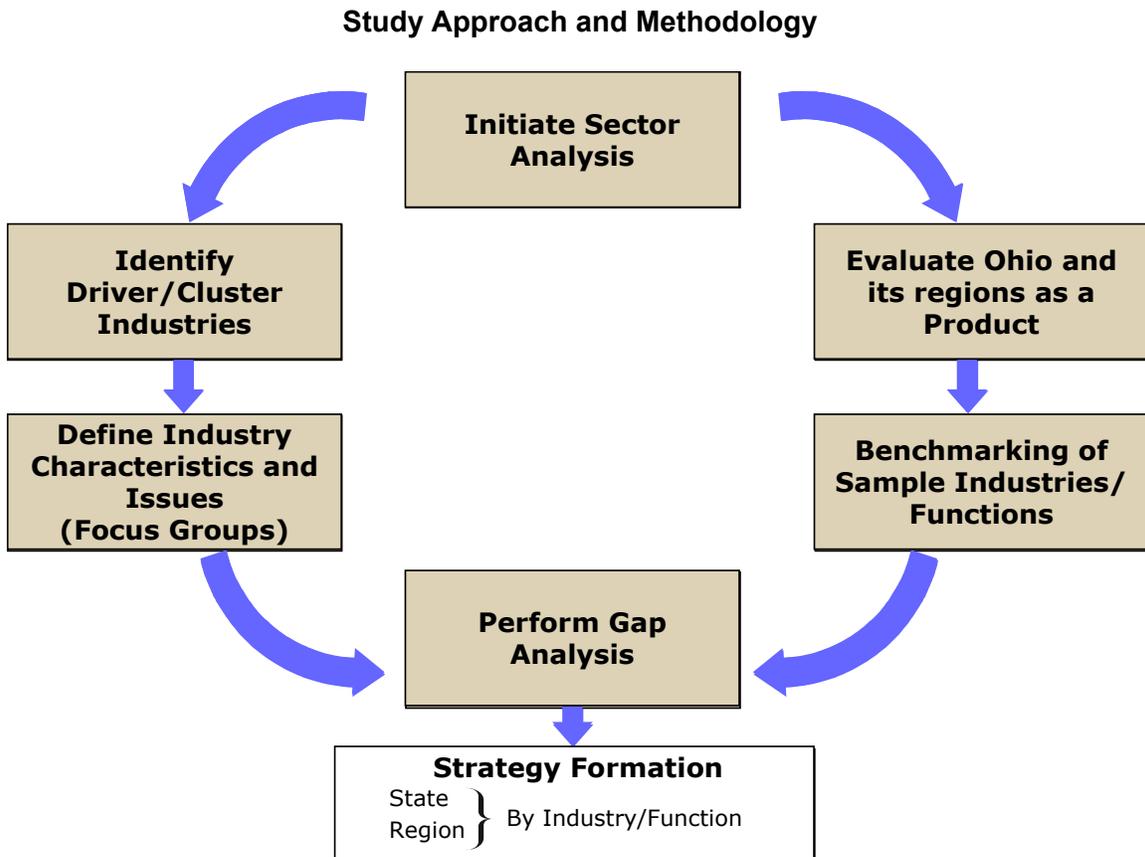
- Position Ohio as a place to locate and grow a business
- Strengthen Ohio's workforce through economic development
- Concentrate, leverage, and integrate new and existing resources

This study represents the first step toward determining effective uses for limited development dollars and providing a road map for future economic success. The task ahead is to draw on the state's history of innovation to craft creative, cohesive, and useful economic strategies and policies that help Ohio build on its business strengths, address its weaknesses, and leverage its competitive advantages for future growth. The study's recommendations will help the state develop plans and tools to promote and retain its core industries, while attracting and nurturing new industries and investment.

This section of the report provides a summary of the study's overall analysis and recommendations. More detailed findings are in Sections 3, 4, and 5 of this report.

APPROACH AND METHODOLOGY

The findings and recommendations of this study are the result of objective statistical analysis and an understanding of “real world” business issues. They incorporate statistical assessment tools, the insight of professional experience, an objective look at competitive forces at work in comparative states and cities, and guidance and feedback from a diverse advisory committee and project working group. Each of the major components of the study is summarized in the pages that follow. The study team first surveyed the state’s historical and current economic landscape to generate a platform on which to build detailed statistical analysis. After the detailed analysis was conducted to identify Ohio’s most important business sectors – in this study, called *driver* industries -- the data were used to identify Ohio’s strengths and weaknesses, pinpoint gaps, and develop recommendations. The graphic below shows the methodology and approach used for this study.



The next several paragraphs provide an overview of the analyses that are summarized in this section of the report and how they fit together to drive the final recommendations.

Macroeconomic Analysis

One of the first objectives of the study was to conduct a high-level macroeconomic review of Ohio’s economy. This section of the report gives a brief look at Ohio’s history

and current demographics to create context for the detailed analysis. Using this as a backdrop, the core components of the economy are highlighted, in addition to related trends in employment, gross state product, and productivity. Observations made within the macroeconomic analysis are echoed throughout the detailed findings and reinforce the final recommendations.

Driver Analysis

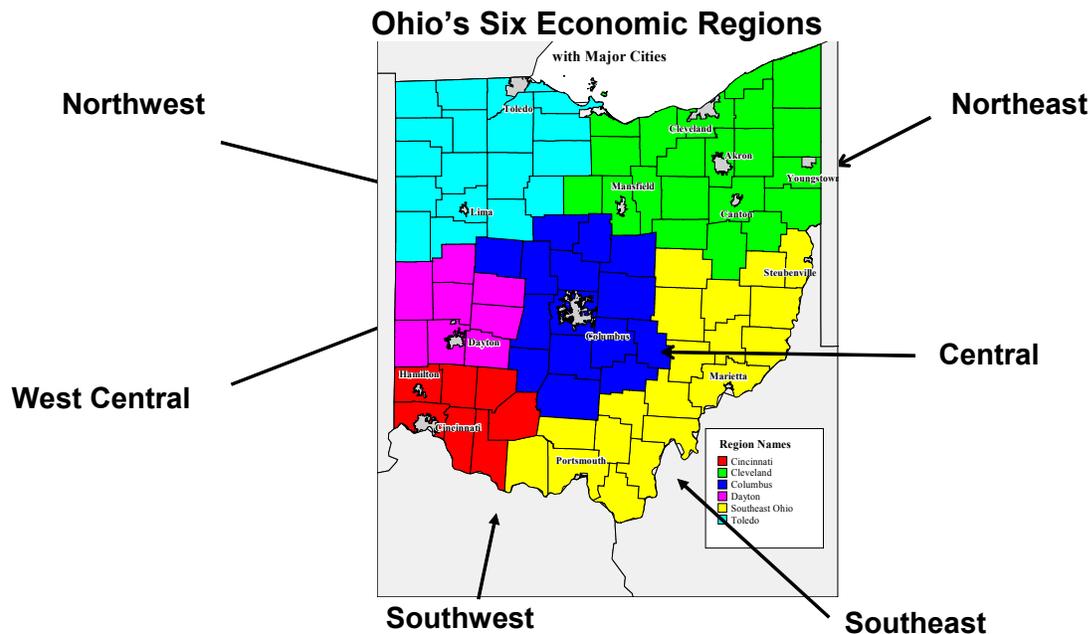
With the macroeconomic analysis in mind, the study team conducted an objective, statistical look at Ohio's economy by identifying key driver industries at the heart of the state's current competitive advantage, using data from Economy.com and IMPLAN. These drivers were then used to identify associated clusters of related supply-chain industries. This level of analysis was particularly useful in establishing an objective, statistical foundation to help rationalize and prioritize areas of focus at state and regional levels. The analysis weighted productivity and output heavily because they are indicators of Ohio's comparative advantage in each industry. This methodology differs from other driver-cluster methodologies, which often focus on employment levels to determine whether an industry is a driver. The study team then measured the overall health of each driver to assist in prioritizing future opportunity. This ultimately enabled the team to make customized economic development recommendations.

Driver Industry Analysis

In addition measuring overall health, select driver industries were subjected to in-depth analysis using both primary and secondary research. This analysis includes an overview of the industry on a national and local level, the overall dynamics of each industry and trends, the key issues that each industry faces, and the industry's overall competitive strengths and weaknesses in Ohio. The secondary research was then supplemented with primary research, drawing on expert panelists, industry experts within the Deloitte network, and industry experts within the ODOD network. For a targeted group of drivers, detailed benchmarking was performed for specific functions, using regional and national "proxy" competitors. This analysis was used to inform both the Industry Profiles and the Competitive Analysis.

Regional Analysis

A major concept reinforced through most components of this study is that Ohio is a portfolio of distinct regional economies. As such, it is important to understand the individual regional portfolios of driver industries. The regional analysis takes the statewide driver analysis to another level by identifying the composition of industry portfolios in each region. The map below shows the six regions identified for the study, based on Bureau of Economic Analysis groupings and business and commuting patterns. Findings within the regional analysis are ultimately combined with findings from the Macroeconomic Analysis and Industry Profiles to generate recommendations that can be applied as region-specific economic development strategies.



Growth Opportunities and Technologies

There are likely growth opportunities that warrant the state's attention but were not immediately apparent from the driver-cluster analysis. To bring these opportunities to the surface, the study team also used a series of statistical analyses and a survey of venture capitalists to identify industries that represent growth opportunities and technologies that are emerging in Ohio. Growth opportunities identified by this analysis are those that are growing in Ohio in terms of both output and location quotient, indicating that Ohio has the potential to capture both growth and a competitive advantage.

Public Policy Analysis

A series of expert panels held in each region of Ohio asked business leaders representing driver industries to identify their business challenges and key issues. The information from these expert panels and a subsequent Internet-based survey was used to identify public policy issues that are affecting Ohio's businesses. These findings were used to add context to other study analyses from the perspective of a real-world business user.

Competitiveness and Benchmarking

The mere presence of an industry cluster in a region or the state does not guarantee the ability to continue to attract, retain, or grow an industry. It is important to establish a level of industry intelligence for the state, and certainly within the regions, around core drivers and clusters. Key to this business intelligence is an understanding of critical success factors for both industries and their related business functions (headquarters, manufacturing, back office, etc.). To assist the regions in beginning to identify these factors and to evaluate their performance within a set of key drivers, the study team examined the strengths and weaknesses of the state, as well as particular metropolitan statistical areas (MSAs) for specific business functions. These locations were compared

at a high level to other proxy locations potentially vying for the same types of industries. The competitive analysis also incorporates the perception surveys of business leaders outside the state and of site selectors. This competitiveness analysis helped drive specific recommendations for improvement and opportunities to capitalize on strengths of Ohio and its regions.

Comparative states used to evaluate Ohio's competitiveness are:

- Alabama
- Illinois
- Indiana
- Kentucky
- Maryland
- Michigan
- North Carolina
- Pennsylvania
- Tennessee
- Texas

The states and MSAs used as benchmarks varied by industry and business function.

Gap Analysis and Recommendations

The combined findings of the study identified issues and gaps that limit Ohio's competitiveness. Based on the analysis, the study team developed recommendations to fill these identified gaps. The analysis also identified Ohio's economic strengths and opportunities, which can be reinforced and used to support expansion and attraction efforts. A detailed set of recommendations, based on the study's key findings, should bolster Ohio's ability to grow, retain, and attract targeted industries and functions and should address factors that impede its competitiveness. The strategic plan provides direction for charting Ohio's future economic success.

The remainder of this report will explore these analyses and findings in greater detail. The goal of this report is that the extensive information included here will be of particular use to economic development officials, business managers, and community leaders operating in the industries and regions discussed.

MACROECONOMIC OVERVIEW

Economic History

To understand the significance of today's business landscape, and the depth and complexities of Ohio's resources, it is important to remember Ohio's legacy as a fundamental American engine of commerce.

Ohio has a history of innovation. The state has proved to be as fertile a ground for invention and entrepreneurship as it has been for the agricultural crops that formed its first major industry. But Ohio's rich vein of innovation has largely come from practical adapters, those who found ways to take an invention and make it better or use it to solve a business problem. Innovation in Ohio is about taking formative breakthroughs and making them practical and useful. From such pragmatists came floating soap, tires with air, cash registers, vacuum cleaners, premixed paints, rolled sheet steel, disposable diapers, aluminum, stepladders, gas masks, stoplights, parking meters, motorized wheelchairs, cellophane tape, artificial hearts, and pull-tab beer cans.

In many ways, the history of Ohio's economy is tied to transportation. The opening of the Ohio and Erie Canal system in 1832 gave the state a waterway of trade, connecting the Ohio River to Lake Erie and beyond. As steamboats began churning up and down the Ohio River and in and out of Lake Erie, the state's economy grew. Shipbuilding was an important industry for a number of Ohio cities during the 19th and 20th centuries. By the 1850s, river transportation was supplanted by railroads. The 20th century ushered in the era of automobiles, which Ohio manufacturers supplied with air-filled tires; a practical engine starter; and a host of metal, rubber, and plastic parts. At the same time, Ohio had given birth to the aviation and aerospace industry, turning the Wright Brothers' 12 seconds in the air into a soaring economic activity – and ultimately ushering in a new economic order in which the entire world is within reach.

Through various facets of this study, Ohio's rich industrial base and legacy of innovation continue to drive its competitive advantages, but this manufacturing core is also subject to increasing competitive pressures. Ohio has an almost unprecedented array of tools at its disposal, but it will need to focus its economic development efforts and resources in areas in which they can have the most impact. Ohio's history of innovation reflects the resourcefulness of its people in tapping the state's rich diversity of raw materials and its knowledge base. An expert panelist summed up the positive aspect of Ohio's array of resources, goods, and services and the can-do spirit of its workforce: "You need it, we've got it."

Ohio's Current Economic Landscape

To provide a framework for analysis, the study team revisited some basic facts about Ohio and compared the state to a number of others in the nation – some completely different with respect to historical and current economic forces and some very similar. The following section provides an overview of Ohio's demographic profile, as well as key economic indicators.

Current Snapshot: Ohio's Economic Sectors

To get some perspective on Ohio's economy, it is helpful to understand the size and dynamics of major economic sectors. For this view, the super sectors of two-digit NAICS

codes have been used. These are the aggregation of industries that make up the complete economy of Ohio.

Evidence of manufacturing's continued significance in Ohio is that the sector remains the state's largest source of output and employment, as illustrated in the following table. Manufacturing accounts for some 15% of all jobs in Ohio and nearly 20% of the state's output, more than twice the output of the next largest sector. Therefore, trouble in the manufacturing sector has meant trouble for Ohio's economy as a whole. The decline in manufacturing employment over the past four years, coupled with employment losses in industries that are tied to manufacturing directly through its supply chain or indirectly through the spending of manufacturing workers, has significantly affected Ohio's economy. Although the percentage of manufacturing workers in both the state and national economy has dropped, Ohio's share of manufacturing jobs has remained nearly 5 percentage points higher than the national share.

Ohio also has a large presence of services industries. The finance, insurance, real estate, and health care sectors all contribute significant output to the state. These sectors appear to be quite healthy: All had fairly strong output growth between 1998 and 2003 and flat to slightly increasing employment.

Ohio's Economic Sectors

2-Digit NAICS Industry Grouping	2003 Output (\$ MM)	Industry Output as a % of Total State Output	1998-2003 CAGR	1993-2003 CAGR	2003 Location Quotient (LQ)	2003 Employment	Industry Employment as a % of Total State Employment	1998-2003 Employment CAGR
Manufacturing	\$77,645	19.5	(2.1)	1.2	1.7	844,680	15.4	(3.9)
Finance and Insurance	\$34,288	8.6	8.9	9.1	1.0	241,220	4.4	1.7
Real Estate and Rental and Leasing	\$31,779	8.0	3.6	4.1	0.7	70,640	1.3	(0.1)
Health Care and Social Assistance	\$31,053	7.8	5.9	5.0	1.2	641,750	11.7	2.3
Local Government	\$30,654	7.7	6.3	5.7	1.1	557,240	10.1	1.6
Retail Trade	\$29,834	7.5	2.6	4.9	1.1	627,750	11.4	(1.0)
Wholesale Trade	\$22,255	5.6	1.8	4.4	1.0	235,060	4.3	(0.4)
Construction	\$19,837	5.0	4.5	6.1	0.9	229,860	4.2	(0.1)
Admin and Support and Waste Mgmt and Remediation Services	\$18,004	4.5	4.9	6.8	1.3	294,760	5.4	(1.2)
Professional, Scientific, and Technical Services	\$16,676	4.2	1.8	4.4	0.6	225,690	4.1	0.1
Other Services (except Public Administration)	\$12,352	3.1	5.7	6.1	1.0	227,350	4.1	0.7
Transportation & Warehousing	\$11,689	2.9	1.1	4.9	1.0	159,740	2.9	(0.2)
Accommodation and Food Services	\$11,360	2.9	4.4	5.7	0.9	419,820	7.6	0.8
Management of Companies and Enterprises	\$10,411	2.6	9.5	9.4	1.0	87,800	1.6	2.6
Information	\$8,226	2.1	(0.7)	1.4	0.5	97,260	1.8	(1.4)
State Government	\$7,809	2.0	1.7	2.7	0.8	165,130	3.0	0.2
Utilities	\$6,769	1.7	3.5	4.2	1.1	22,650	0.4	(1.3)
Federal Government	\$6,547	1.6	0.6	2.2	0.6	79,450	1.4	(1.1)
Arts, Entertainment, and Recreation	\$3,174	0.8	8.1	6.4	1.0	68,280	1.2	0.8
Educational Services	\$2,770	0.7	3.7	4.2	0.7	86,150	1.6	0.6
Farms	\$1,549	0.4	(5.7)	(1.0)	0.6	8,910	0.2	(3.9)
Mining	\$1,521	0.4	1.6	4.2	0.3	10,800	0.2	(3.7)
Military Personnel	\$1,489	0.4	4.5	1.7	0.3	35,830	0.7	(0.6)
Private Household Workers	\$309	0.1	(0.5)	2.1	2.1	50,300	0.9	(2.8)
Logging	\$67	0.0	11.2	10.1	0.4	920	0.0	5.0
Fishing, Hunting, Etc.	\$10	0.0	13.3	18.4	0.0	1,340	0.0	5.8
Total	\$ 398,202	100.0	2.8	4.3	1.0	5,490,400	100.0	(0.4)

Source: Economy.com

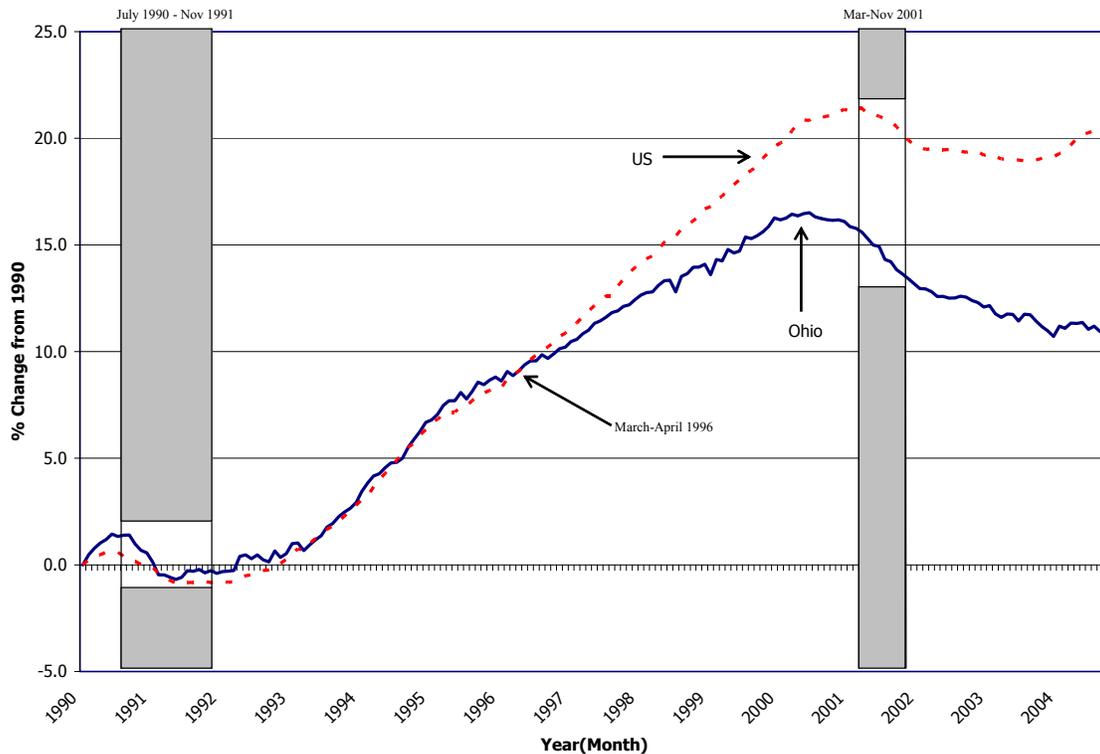
Note: CAGR (compound annual growth rate) is average annual growth rate over a specified period of time. CAGR is calculated using the following formula: $CAGR = \left(\frac{\text{present value}}{\text{base value}} \right)^{\frac{1}{\text{#of years}}} - 1$

Employment

Evidence that Ohio's historical strengths have been subject to increasing competitive pressures recently is indicated by employment statistics. Employment figures offer the most dramatic assessment of Ohio's economic well-being and highlight the impact of the

recent recession on the state. As the following chart shows, Ohio's employment picture fairly closely tracked that of the United States through the mid-1990s, but Ohio diverged from the rest of the nation before the recent recession. The national employment downturn began in March 2001. Employment began to decline earlier in Ohio, starting in July 2000, and the decline has been steeper and longer-lasting than for the nation overall. From Ohio's employment peak in June 2000, the state has lost 263,900 jobs. That number represents 4.7% of the state's total employment at its peak. Ohio's seasonably adjusted jobless rate was estimated to be 6.0% for September 2004, compared with 5.4% for the nation. Preliminary data for November 2004 put the state's unemployment rate at 1.1% higher than the national average. At that time, 39 of the state's 88 counties had unemployment rates that exceeded the state average, with five counties experiencing double-digit joblessness.

U.S. and Ohio Employment Growth
Percentage Change in Employment, January 1990 to August 2004



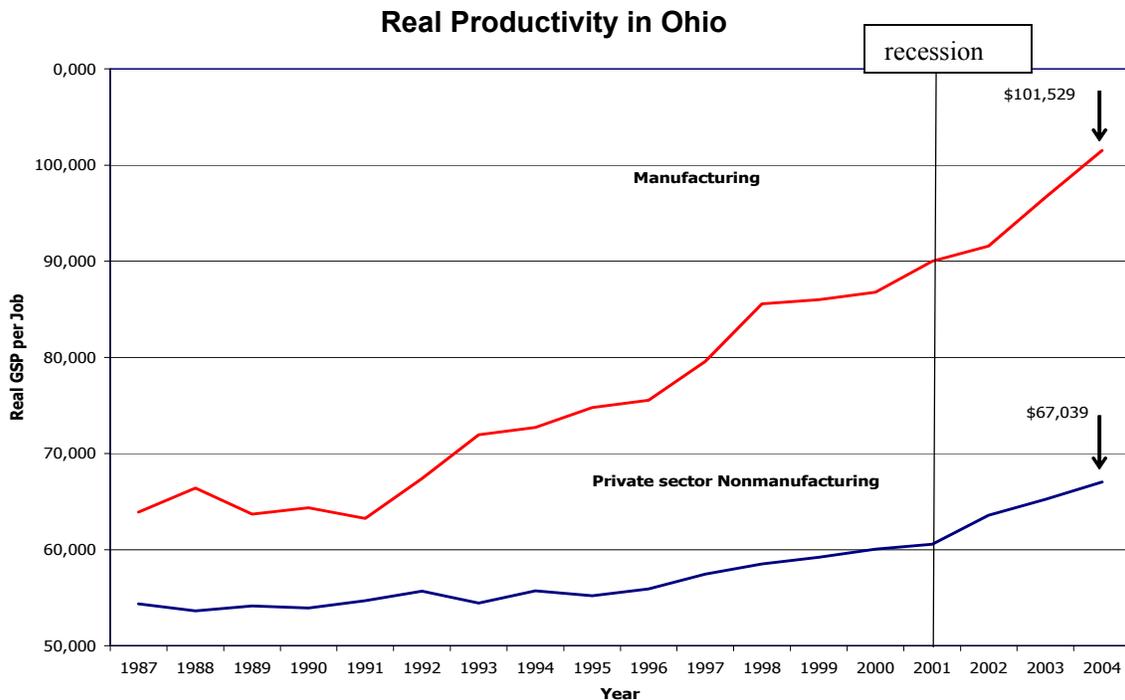
Source: U.S. Bureau of Labor Statistics, CES; shaded areas are periods of national recession

Another way of measuring the depth of employment loss in the state is to note that Ohio has accounted for 26% of the nation's overall loss of 827,000 jobs, measuring from the official start of the recession in March 2001. From its highest point to its lowest point, Ohio lost nearly 5% of its total employment, according to figures from the state's Bureau of Labor Market Information. In contrast, the nation lost little more than 2% of its total employment at its lowest point in August 2002. This change in fortune has left Ohio businesses and workers wary about the future.

Productivity

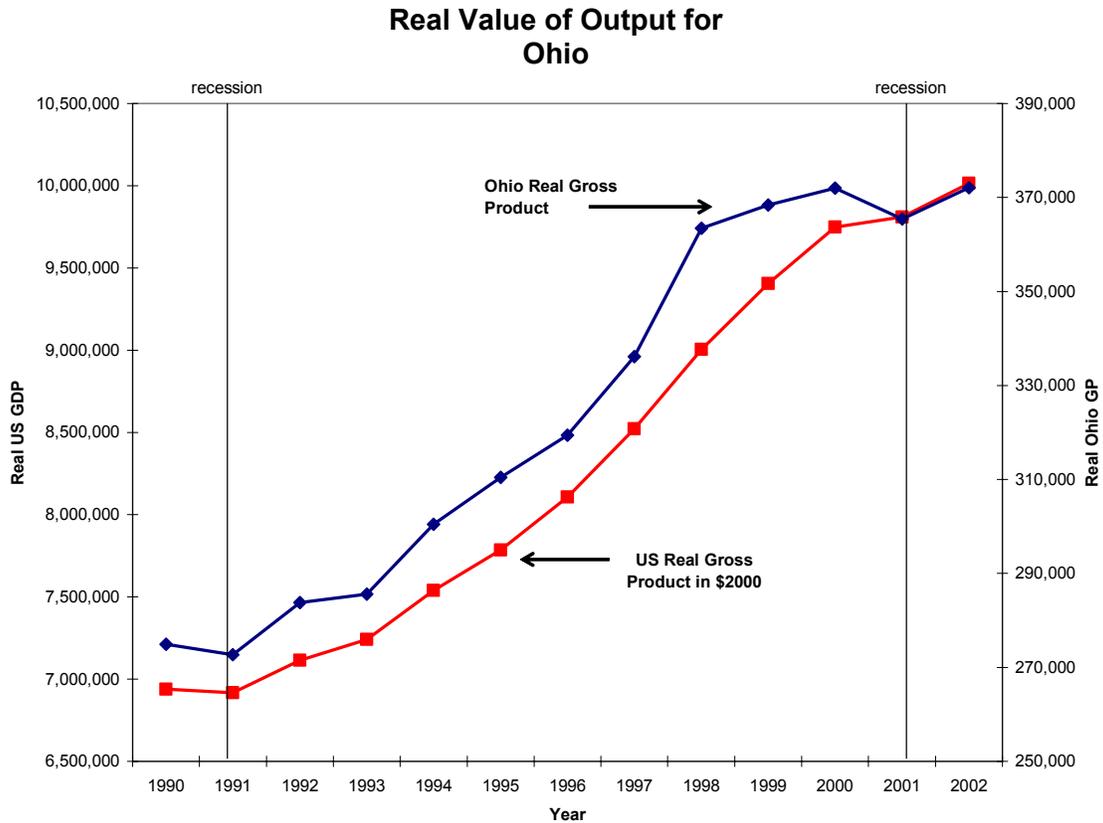
Employment in Ohio has not kept pace with increases in productivity. Although the employment picture for Ohio over the past several years has been less than positive, productivity has risen significantly in Ohio's private sector since the beginning of the 2001 recession. Companies have been adding and investing in technologies and processes that allow them to do "more with less" – maintaining or increasing their output, even as employment has declined. As the following chart shows, although job losses have plagued the industry, manufacturing has decidedly outpaced other sectors in terms of productivity growth. In 2004, manufacturing contributed \$34,490 more per job to the gross state product than non-manufacturing sectors. Manufacturing productivity has improved in Ohio, but, heading into the recession, it fell behind the national average for the first time ever and now lags the nation by roughly \$2,000 per manufacturing job. Productivity growth continued nationally during the recession as companies learned to work leaner and smarter by integrating new technologies and a global supply chain. For the state to excel, continued focus on productivity will be critical.

Improving productivity has contributed to the growth of economic output in the state, which, in turn, will drive job creation. Continuing productivity growth is essential to driving growth in Ohio's economy.



The real value of Ohio's gross state product, shown in the following graph, paints a picture of a vibrant state economy during the 1990s that, in most years, grew at a rate similar to the national average. The value of the total amount of goods and services produced in the state increased at the national rate through the 1990 recession until 1998. At that point, the state entered a recession, a full three years ahead of the nation. However, Ohio's rebound from that recession tracks perfectly with the national recovery.

Although being average should not be an economic goal for the state and its people, the economic reality as depicted by the real value of gross product is very different from the reality as experienced by the state's workers. To grow faster than the national average in future years, Ohio will require a new product set -- a group of goods and services that are new, are likely to experience growing demand, and are not commodities. The approach most likely to yield success is one that begins by looking at the state's current set of economic strengths, builds on those strengths, and then invests in an economic infrastructure capable of generating new product classes.



Source: U.S. Bureau of Economic Analysis, Gross State Product

Summary

Although Ohio's economy had a difficult time weathering the recent recession, especially with regard to job losses, most industry sectors managed to maintain output growth. Hardest hit seems to have been Ohio's manufacturing sector, which has suffered a nearly 4% loss in employment since 1998. Productivity improvements, however, have sustained Ohio's economy, keeping output growing and maintaining incomes. Continuing productivity growth is the key to driving economic output, which is the basis for genuine job creation.

OHIO'S ECONOMIC DRIVER INDUSTRIES

Understanding driver industries, those that make up the economic heart of the state, is critical to understanding Ohio's economic strengths and opportunities and understanding how to target economic development resources. The study team's economic analysis yielded 17 driver industries for the state. Driver industries were identified based on the variables described in Section 5 of this report, which focus heavily on degree of specialization in Ohio, industry output or value added in manufacturing, and productivity. This approach may yield different results from previous studies that emphasized employment to determine key drivers.

Ohio has a broad portfolio of industries, in both manufacturing and services sectors. There is no single, dominant industry although many drivers supply motor vehicle manufacturing. Each of the six regions defined in this study also has its own portfolio of drivers industries, some quite different from those at the state level. Many of the regional drivers cancel each other out in terms of size or importance at the state level. In other words, an industry that is an important driver in one region may be offset at the state level by an industry that is an important driver in two other regions. Nevertheless, these regional drivers are important to each region's economy and, therefore, become important when developing Ohio's economic development strategy and policies. Examples of important regional industries include chemicals, food processing, aerospace products and parts manufacturing, and machinery manufacturing. A detailed table listing driver industries for each region appears in Section 4.

Ohio Statewide Driver Industries (ranked by 2003 output dollars)

NAICS	Industry	2003 Output (\$MM)	1998-2003 Output CAGR	1993-2003 Output CAGR	2003 Output Location Quotient (LQ)	2003 Employment	1998-2003 Employment CAGR
Professional Services/Value-Added Services		\$37,497					
5221	Depository Credit Intermediation (Banks)	\$19,580	12.4%	10.7%	1.6	76,150	0.3%
5511	Headquarters and Division Offices	\$10,411	9.5%	9.4%	1.0	87,800	2.6%
5241	Insurance Carriers	\$ 7,506	5.8%	7.8%	1.3	72,790	0.8%
Automotive and Related		\$20,044					
3363	Motor Vehicle Parts Mfg.	\$12,471	1.3%	3.3%	7.3	96,090	-3.0%
3361	Motor Vehicle Mfg.	\$ 4,969	1.2%	3.4%	7.0	31,210	-4.4%
3362	Motor Vehicle Body and Trailer Mfg.	\$ 2,413	1.1%	2.6%	10.9	10,600	-6.1%
3369	Other Transportation Equipment Mfg.	\$ 191	-8.4%	-8.1%	2.1	980	-15.5%
Bio-Medical		\$10,793					
6221	General Medical and Surgical Hospitals	\$10,793	5.6%	3.8%	1.4	200,040	1.6%
Other Services		\$ 6,330					
5613	Employment Services	\$ 6,330	4.6%	7.7%	1.1	129,780	-1.5%
Energy Production and Transportation		\$5,684					
2211	Electric Power Generation, Transmission and Distribution	\$ 5,128	3.7%	4.0%	1.0	16,870	-1.3%
4860	Pipeline Transportation	\$ 556	2.0%	5.3%	0.7	1,100	-1.6%
Metals and Metal Working		\$4,406					
3311	Iron and Steel Mills and Ferroalloy Mfg.	\$ 1,822	-5.4%	-1.2%	4.6	14,980	-8.4%
3321	Forging and Stamping	\$ 1,596	-3.5%	2.4%	4.5	17,950	-2.7%
3312	Steel Product Mfg. from Purchased Steel	\$ 988	-5.4%	-1.2%	7.5	10,380	-5.6%
Environmental Remediation Technology		\$2,131					
5622	Waste Treatment and Disposal	\$ 2,131	9.2%	9.6%	3.5	5,580	-0.8%
Building Products		\$1,141					
3352	Household Appliance Mfg.	\$ 1,141	2.2%	0.7%	5.3	13,600	-2.0%
Logistics/Distribution Centers		\$708					
4889	Other Support Activities for Transportation	\$ 708	-8.4%	-3.5%	9.2	5,500	-6.9%

Source: Economy.com

Note: CAGR (compound annual growth rate) is average annual growth rate over a specified period of time. CAGR is calculated using the following formula: $CAGR = (\text{present value}/\text{base value})^{(1/\# \text{ of years})} - 1$

There are a number of reasons why particular industries have historically been or are now based in Ohio and are economic drivers. One reason is access to natural resources or raw materials, such as wood or agricultural products. Unfortunately, many of these industries have become commoditized and are now in decline, as more of the industry's production moves elsewhere (either offshore or to other U.S. regions with additional resources or lower labor costs). An example would be the metals industry, which is still important to the state but has been declining in recent years. Another reason that industries established in Ohio is its central location, which is within a day's drive of most Eastern and Midwestern population centers. Food products are an example of such an industry. Firms that produce in Ohio and ship to other areas often become economic drivers because their level of exports out of the state is strong.

Another characteristic of many of Ohio's driver industries is that they are "supplier" industries: These industries produce goods, such as glass containers or steel plates, that become inputs into other industries. A number of Ohio's driver industries are suppliers to the motor vehicles manufacturing industry, which is one of the few "end customer" industries in Ohio. These suppliers have located in the state to be closer to motor vehicle production plants in Ohio, Michigan, and Kentucky.

It is important to note that, while most of the driver industries have seen output growth over the past five to 10 years, they have not had corresponding employment growth. Ohio's economic growth has been a productivity story over the past decade because companies have been able to increase their output by streamlining or automating processes and systems and, therefore, produce more with fewer resources.

For each driver industry, the economic analysis included an input-output model to determine other industries that supply the driver and those that buy the driver's output. It is important to understand such buy-sell relationships because the dynamics of driver industries affect supplier and buyer industries. For example, when motor vehicle production declines, the market for Ohio industries supplying motor vehicle materials and parts declines as well. Another example is the growth of insurance sales, which has driven benefits in the entire supply chain, from call centers and sales offices to business services such as legal and advertising.

An in-depth exploration of the particular dynamics and challenges of each of the state's six economic regions appears in Section 4 of this report. To explain the portfolio nature of the state's economy, the following are regional summaries with driver industry overviews:

- **Northeast** -- The Northeast region has a diversified portfolio of driver industries in many different sectors. Noted for its tradition of steel and other heavy manufacturing, which still has a strong presence today, the region is also very strong in high-growth services industries. Insurance, banking, and other professional services top the list of 32 identified drivers. The next biggest category of industries in the Northeast region is metals and metalworking.
- **Northwest** – The Northwest region has a highly diversified portfolio of 30 driver industries, with a primary concentration in manufacturing, especially automotive-related manufacturing. A large chemicals sector is driven by plastics and rubber products manufacturing, which supplies the automotive industry. Food manufacturing is also substantial. Notable service industries in this region include

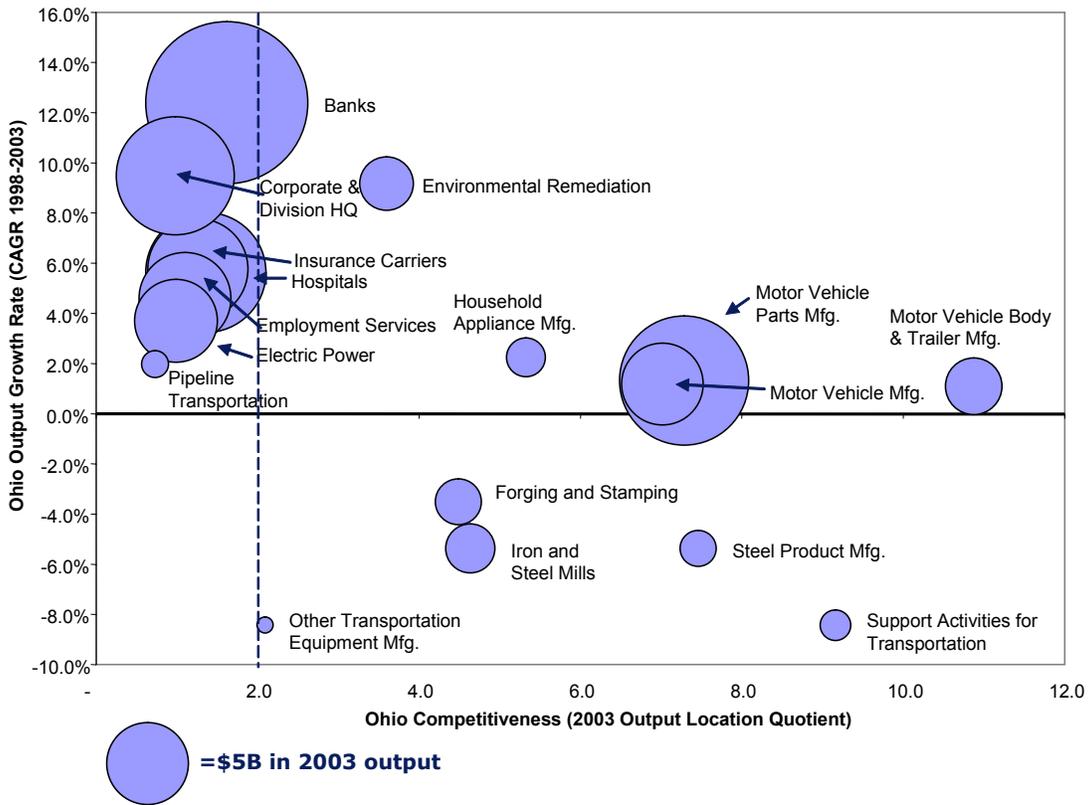
hospitals and a substantial number of corporate and regional headquarters offices.

- **West Central** – The West Central region is dominated by the presence of two manufacturing industries: automotive and aerospace. Banking is also large for this region. Additional drivers include other manufacturing industries, such as machinery, chemicals, building products, metals, and food. Energy production and environmental technology are also important economic drivers in the West Central region. In all, the statistical analysis identified 18 drivers for the West Central region.
- **Central** – This is an economy that is divided fairly equally between manufacturing and services activities. Although the region is associated with such service industries as insurance, retail, and distribution, there is also a strong presence of manufacturing industries, including automotive, chemicals, and food. Among the 23 identified drivers, the automotive industry and professional services are the two largest and are of equal size in the Central region. The Central region is home to many headquarters, many of them “homegrown” companies such as Wendy’s and Limited Brands, and a significant distribution and warehousing sector capitalizes on the region’s central location and its access to transportation.
- **Southeast** – The Southeast region is not dominated by any one driver industry. Rather, it is a portfolio of 14 moderately sized driver industries, many of which are tied to the region’s rich natural resources. It is no surprise that industries such as coal mining, iron and steel mills, wood products, and food manufacturing make the list of economic drivers for this region.
- **Southwest** – The economic analysis yielded 20 drivers for the Southwest region. The region is dominated by two services industries: corporate and division headquarters and banking, both of which have experienced strong output and employment growth. Hospitals are another notable service industry in the region. There is also a strong presence of manufacturing, especially in the aerospace and automotive sectors, which have been experiencing healthy growth. Chemicals, energy, food, and environmental technology are other leading industries for the region.

PORTFOLIO ANALYSIS FOR STATE DRIVERS

To evaluate the relative health of driver industries and their economic development needs, it is helpful to analyze them as a portfolio. The following chart shows Ohio’s statewide drivers represented by their output growth rate and output location quotients. The X axis represents the industry’s output location quotient, or level of specialization and exports, and the Y axis shows each industry’s average annual output growth between 1998 and 2003. The size of each “bubble” represents the dollar level of gross product, which is similar to the value added for that industry. Thus, the industries in the upper right-hand quadrant are industries with high growth rates and a high degree of specialization in Ohio, and those in the lower left-hand quadrant have had slower growth and have a lesser degree of specialization. A similar portfolio analysis for each of Ohio’s six regions is in Section 4 of this report.

Statewide Driver Portfolio Analysis



Source: Economy.com; CSU/Deloitte Analysis

Quadrant Analysis

Each quadrant of the chart represents a group of industries facing similar strategic issues and opportunities. Therefore, the dynamics of each quadrant will drive economic development objectives and service needs.

Portfolio Analysis Framework



Upper Right Quadrant – Strong Economic Base

This quadrant shows industries that can be regarded as strong economic base drivers. The industries are typically dominated by large establishments, have experienced stable

growth and are highly competitive in Ohio, with output location quotients greater than 2.0. These industries are generally in good health. These industries include household appliance manufacturing, motor vehicle and parts manufacturing, motor vehicle body and trailer manufacturing, and environmental technology.

- **Economic Development Objective:** Sustain growth by supporting competitiveness through companies' income statements. Develop state policies that either encourage top-line revenue growth or minimize operating costs.

Lower Right Quadrant – Traditionally Competitive Base Drivers

This quadrant contains industries that are highly competitive but manufacture commodity products. In recent years, they have suffered a cyclical decline. These companies' strategies may be challenged, and they rely on new product development and process improvement for growth and financial health. In the state, these industries are: support activities for transportation, steel products manufacturing, iron and steel mills, forging and stamping, and other transportation equipment manufacturing.

- **Economic Development Objective:** Sustain competitiveness as growth slows in the national industry. Support strategy change and innovation efforts to improve growth.

Lower Left Quadrant – Important Supplier Base

This quadrant typically contains industries that are less competitive than the other drivers in Ohio and are not growing. These drivers need a strategic transformation to improve their economic health and move up the value chain. Fortunately, Ohio does not have any state driver industries in this quadrant.

- **Economic Development Objective:** Retain stronger, more aggressive segments of industries by focusing on firm-level strategies. Individual firms, rather than the industry as a whole, must change their specific ways of doing business by developing new products, tightening their supply chain or leaning out their production process.

Upper Left Quadrant – Growth Opportunity Base

This quadrant contains industries that have grown significantly over the five-year study period within the state but are not yet strongly competitive nationally. These are industries that Ohio may be able to build; they are industries that have the opportunity to become stronger economic drivers for the state in the future.

- **Economic Development Objective:** Provide opportunities to sustain and increase competitiveness in the state. Opportunities have to be addressed industry by industry. (Section 3 addresses several in detail.)

Generally speaking, Ohio's services industries, such as banking, hospitals, and insurance, are in the upper left quadrant of the matrix. These industries have high output growth rates and moderately high location quotients. There is a real opportunity for Ohio to drive growth in these industries. Ohio merely capturing its "fair share" of industry growth will drive fairly significant economic growth for the state. Ohio's manufacturing industries, on the other hand, are highly specialized, with high output location quotients, but output and employment for most of these industries either are not growing or are growing at very modest rates. Many of these industries have challenged strategies and need help with process improvement and product innovation to sustain their businesses.

Driver Interactions

Three driver industries and their supply chains have especially large, important, and visible constituencies in Ohio — the automobile assembly industry, the chemicals industry and its polymer component, and the food products industry. Each tends to claim parts of the other when representing itself to the public and, at times, when vying for public attention and resources, the three industries are placed in a zero-sum game. As the graphic on the following page shows, this is an incomplete view of economic reality in Ohio.

When viewed in isolation, each industry is a large and important contributor to the state's economy. In 2003, the motor vehicle industry contributed \$20 billion in gross product to Ohio and had a broad supply chain. Chemicals is a \$12 billion industry, and the food industry generates \$6 billion in gross product. However, these three industries cannot be viewed in isolation because they are interrelated in two dimensions.

The chemicals industry is a direct supplier to the automobile industry, accounting for 4% of its supply chain. The chemicals industry is also a contributor to the food products industry through packaging. In the future, farm products will become a source of polymer feed stocks. Soybeans are a source of inks, and corn byproducts are competitive in the market for environmentally sensitive plastics.

As with many industries in Ohio, these three drivers are mutually supportive: They are interconnected through their supply chains. They have overlapping business functions -- many of which are themselves activities important to the state -- such as headquarters, research design, product development, back-office administration, production, procurement, logistics, customer support, and sales. Economic development opportunities lie at the intersection of industry and business function.

For example, as the graphic illustrates, all industries have headquarters in their supply chains. They also require research and development, warehousing, and information technology functions. These particular business functions are themselves drivers in the state or regional economies. The distribution and warehousing industry, for example, provides functions critical to the growth and success of the automotive, chemicals, and food products industries. In turn, the business demands of the automotive, chemicals, and food products industries are critical to the growth and success of Ohio's distribution and warehousing industry.

This interconnectedness of business needs and activities extends to industries, such as medical equipment, that represent critical growth opportunities for the state. As can be seen in the graphic, the supply chain and business function needs for the medical equipment industry overlap the supply chain and business function needs for the three driver industries shown. Industries do not function in isolation; they make up an interconnected constellation of activities and needs.

OHIO'S GROWTH OPPORTUNITIES AND EMERGING TECHNOLOGIES

Introduction and Methodology

The primary goal of the overall sector study has been to assess Ohio's economy and that of its six regions, with a focus on identifying industries at their core and highlighting the challenges and opportunities those industries face. However, a road map for Ohio's economic future would be incomplete without looking down the road to what industries, technologies, and opportunities may be emerging.

There is no single method that can identify the industries and technologies that are emerging as sources of competitive advantage in Ohio and its regions. The project team took a multidimensional approach to this challenge. Two separate analyses were undertaken to identify emerging opportunities: one for industries and another for technologies.

To determine growth opportunities, the study team began with a quantitative analysis of gross product and productivity data at the four-digit level of NAICS for all industries that were not identified as drivers of the state's economy. (Drivers of each regional economy were excluded from the subsequent regional analyses; regional results appear in Section 4). This analysis identified industries experiencing large growth in gross product, large increases in productivity, and low gross product location quotients. These factors indicate a growing market for the product, Ohio's competitiveness, and the state's opportunity to capture market share. A parallel set of calculations identified large and important industries that were not classified as drivers. These industries had large increases in gross product, increases in productivity, and high gross product location quotients. These analyses were supplemented by qualitative findings from industry specialists, expert panelists, and business leaders who responded to an Internet-based survey.

More detail regarding the methodology and the findings of this analysis can be found in Section 3 of this report.

A Future Built on Strengths

To put it succinctly, Ohio's future lies in its past. Growth opportunities and emerging technologies largely are being built on the state's current and historical strengths. Innovation and adaptation are growing out of the state's existing economic base.

"Following the money" is a useful and enlightening exercise in understanding Ohio's most likely opportunities for future economic success. The study team surveyed a sample of venture capital firms across North America to determine the technologies and industries they were investing in and to ascertain their opinion of Ohio's technology specializations. Respondents were asked to rate each technology or product as a potential investment in Ohio and in the United States. The venture capital community, which typically finances innovations, stakes its business success on identifying investment areas that represent the best opportunities for market success.

Ohio has newly found acceptance among venture capitalists for the potential investment opportunities it provides. Survey respondents identified several areas in which the state holds a competitive advantage. These are:

- Medical equipment and research
- Fuel cells, with off-grid civilian applications being favored:
 - Heating, ventilation, and air-conditioning
 - Automotive
 - Electric power generation
- Nanotechnologies, particularly
 - Nanomaterials
 - Nanochemical applications
 - Nanobiological applications
 - Intersection of nanotechnology and polymer science
- General polymer technologies, as well as:
 - Photonic polymers
 - Electronic polymers
 - Biocompatible polymers
 - Conductive polymers
 - Liquid crystal displays
- MEMS (micro-electrical-mechanical systems) applications, particularly in the areas of:
 - Micromachining
 - Automotive
- Information technology, particularly for the:
 - Medical industry
 - Financial service industry
 - Security database and data-mining applications

These particular technologies and products were most likely chosen as the best fit for Ohio because they are directly related to the state's key industrial and research strengths.

For example, the polymer industry forms a dominant portion of Ohio's depth in chemistry and bridges the lubricants, coatings, rubber, and plastics industries. The strength of this industry is historical, intellectual, and corporate. Several of Ohio's regional economies are effectively chemistry economies when agricultural chemicals, soaps and cleaning compounds, and petroleum products are added to polymers. Ohio also has deep strength in its corporate laboratories in advanced materials research, such as steel, polymer chemistry based on oil and gas, and products that can be developed from corn and soybeans. There is the real prospect of major advances when Ohio's agricultural research engine, biotechnology, and organic chemistry meet.

Medical equipment and instruments flow out of the clinical strengths of Ohio's research hospitals and out of the state's established industry strengths in imaging, sterilization, equipment, instruments, and contract pharmaceutical processing. Ohio is a leader in clinical trials, and external rankings of clinical excellence place Ohio's hospitals and clinical practices at the top of national lists.

The state has unusual research depth in power and propulsion systems at NASA Glenn Research Center, General Electric's jet engine division, and the companies that revolve

around military contracting at Dayton's Wright-Patterson Air Force Base. This is augmented by a large number of automobile engine manufacturing facilities that are located across the state. Battery technologies and alternative energy sources are the focus of research at NASA Glenn, Energizer Corporation, and a number of embryonic fuel cell companies. A supply chain is organizing in Ohio around fuel cells.

A number of cross-cutting areas of technology cannot be captured through an industry lens. Ohio is becoming recognized as a center for nanotechnology research and production. Nanotechnology represents a set of technologies that cut across medical, polymer, and advanced materials research. The technology can be applied everywhere from sunglass film to medical membranes, but area venture capitalists noted that the technologies have yet to find substantial market penetration.

Ohio is also a place where "machines on chips" or micro-electro-mechanical systems (MEMS) technologies are being "packaged" and adopted into instruments, controls, and electronics processes. Ohio was named by *Small Times* magazine as the 10th MEMS hotspot in the United States.

These strengths recognized by the venture capital community also largely echo the six areas of core technology competencies already identified by Ohio Governor Bob Taft and the Ohio Department of Development. These areas build on the state's existing research strengths in universities, hospital-affiliated institutes, federal government laboratories, and private-sector research institutions clustered in the study and development of:

- Advanced materials
- Biosciences
- Instruments
- Controls and electronics
- Information technology
- Power and propulsion

Each of these areas is associated with demonstrated intellectual and human capital depth within the state. And, as commercial investment opportunities have emerged, private companies have organized to leverage the flow of research and development dollars into the state.

These technological and research strengths largely complement and bolster the industries that the study team identified as growth opportunities for Ohio. Just as identified emerging technologies tend to stem from the state's existing knowledge base, so too do seven potential growth industries.

- Nondepository credit intermediation, which includes credit card issuers, consumer lending, and sales financing, is an emerging driver statewide and in the Northeast, West Central, and Southwest regions. This industry has a large back-office component and has characteristics that are similar to general shared-services business functions.
- Headquarters and administrative services, an opportunity linked to the nondepository credit intermediation industry, is emerging as a statewide driver, as well as a driver of the West Central economy.
- Computer systems design and related services is an industry largely associated with the state's identified driver industries, such as health care, finance, and

distribution. The industry appears as an emerging driver in all regions of the state, with the exception of the Northwest and Southwest.

- Scientific research and development services is an emerging driver in the Southeast. However, prominent establishments in this industry are located throughout the state. Many of the facilities have a direct connection to the state's industrial heritage. This is true in aerospace, automobiles and the automobile supply chain, polymers and other chemistry-based products, and metalworking. Other research facilities are tied to the clinical medical excellence of Ohio's regional economies.
- Specialized design services is an emerging driver industry in the Southeast. However, there is strength in industrial design in the Central and Northeast regions, as well. Design represents a major resource in freshening the state's product base, and it is an area in which the state has demonstrable intellectual excellence.
- Electronic and precision equipment repair and maintenance is a statewide emerging driver, even though it is not a driver in any one region. This industry is linked to the state's central location in the industrial heartland of America, and repair facilities are spread across the state's economic regions.
- Tourism was identified as a growing industry in the Northeast and Southwest in the data analysis, and the growth of leisure industries is an opportunity for all parts of the state. All regions of the state have growing tourist industries. These industries are parts of the base of the regional economies of Ohio — from the sport fishing industry along Lake Erie to the lure of the Appalachian hardwoods of the Southeast. The business challenge presented by the tourism and arts industries in Ohio is that, setting aside the two major theme park operators, this is an industry of small businesses that do not have the scale or ability to advertise in multistate regional markets. Additionally, the region-states within Ohio have different product mixes and value propositions. This means that a single and simple brand for Ohio as a whole will have difficulty conveying the recreational opportunities in each of the state's regions. What the region-states do share is a market failure in their ability to support their regional brands. Ohio and its regions cannot promote a tourist brand without state and regional intervention. The industry needs to fund its brand through taxes or industry membership fees, and it needs a government-supported body to develop and market tourism under a brand.

The common thread uniting these diverse industries and technologies is their tie to Ohio's existing comparative advantage. Industries that represent growth opportunities, for the most part, reflect business services that support Ohio's driver industries and leverage the state's industry knowledge and comparative strengths. The technologies for which Ohio is most likely to achieve a comparative advantage are those that can be applied to driver industries. Examples include fuel cells for the heating, ventilation, and air-conditioning industry, the automotive industry, and electric power generation; nanotechnology and precision machining to support manufacturing; information technology for the medical and financial industries; and medical equipment that is driven by Ohio's expertise in clinical medicine. This finding underscores an imperative for future economic success: Ohio must continue to drive new and emerging growth from its core strengths, and the state must help align knowledge resources with those that can commercialize ideas.

PUBLIC POLICY ANALYSIS

Overall Findings

It is important to understand how Ohio's public policy and other general business issues affect businesses in the state. These factors are critical when businesses are making investment decisions. Ohio must be competitive with other locations on basic public policy issues to retain and attract investment. Although Ohio consists of six distinct regional economies, for the purposes of this study, industry leaders from each of those regions generally agree on major public policy issues. During 12 expert panels held throughout the state, participants voiced similar concerns: the Ohio tax system, health care costs, workers' compensation, liability and torts, global competitiveness, and utility costs. They also listed workforce issues, although these varied by region, industry, and job level. Environmental regulation enforcement was a concern for specific industries and in the Northeast, Northwest, and Southeast regions. There were few concerns about infrastructure: Southeast panelists saw problems with rail and electricity services; Central panelists said the trucking and transportation network was becoming a problem; West Central panelists considered air service to be lacking.

Public policy concerns common to all six regions were:

- Ohio's tax system
- Health care costs
- Workforce
- Workers' compensation costs and system
- Liability and torts
- Global competition and fair trade
- Natural gas costs
- Global availability and cost of raw materials

Surveys conducted during the expert panels and over the Internet indicate the greatest concerns shared by Ohio business leaders. The following table summarizes the public policy data from the Internet-based survey of business leaders. Health care costs are of most concern to respondents, followed by energy prices, Ohio's tangible personal property tax, torts, and the other Ohio taxes. Infrastructure and utility availability are not considered to be problems by the majority of respondents.

**Responses to the Question:
Which of the following public policy areas is a problem for your business?**

Public Policy Area	1 Not a Problem	2	3 Neutral	4	5 Major Problem	N/A	Response Average Rating
Health care insurance costs	4%	1%	3%	24%	64%	3%	4.5
Energy Prices: Electricity	8%	8%	24%	30%	26%	3%	3.6
Energy Prices: Natural Gas	9%	10%	23%	32%	24%	3%	3.5
State of Ohio Business Taxes: Tangible personal property tax	8%	10%	21%	29%	20%	11%	3.5
Torts & associated insurance & legal costs	13%	8%	20%	28%	26%	5%	3.5
State of Ohio Business Taxes: Corporate Franchise Tax	8%	8%	33%	24%	15%	13%	3.4
State of Ohio Business Taxes: Municipal profits tax (wage tax)	8%	8%	30%	25%	16%	12%	3.4
Workers compensation	10%	14%	21%	34%	15%	6%	3.3
Corporate Sales Taxes	10%	13%	36%	19%	13%	10%	3.1
Environmental Regulations	11%	17%	42%	17%	8%	4%	3.0
Tax abatement	14%	10%	47%	11%	8%	9%	2.9
Availability of bank loans/ capital	31%	9%	26%	13%	14%	7%	2.7
Electricity Service & Availability	23%	19%	31%	18%	5%	4%	2.6
Wireless network availability	31%	15%	31%	14%	4%	4%	2.4
Road infrastructure	30%	18%	33%	9%	5%	5%	2.4
Railroad infrastructure	41%	11%	30%	5%	3%	10%	2.1

Source: Sector Analysis Study online expert panel survey

Business leaders shared a concern about Ohio's current business climate. They acknowledged that issues such as global competition and health care costs transcend Ohio and are economic concerns of national scope, but respondents wanted the state to address problems within its control – the tax structure, workers' compensation, and legal liability -- to provide a reason for companies to remain in, expand in, or come to Ohio.

The following are summaries of major public policy issues for business leaders across the state. Because these are based primarily on expert panels and an Internet survey, they are not exhaustive examinations of these issues. Rather, the study team has assembled participants' and respondents' candid points of view.

Health Care Costs

Sixty-four percent of survey respondents reported that health care costs are a major problem for their businesses, compared to only 5% who said health care costs are not a problem. Although this study did not explore whether costs are higher or rising faster in Ohio than the rest of the nation, panelists consistently cited the health care costs as a top concern. Business leaders noted 15% to 20% increases in health care costs, which are outpacing companies' profitability growth and claiming 5% to 30% of revenue. In response, business leaders said they have tried to offset price spikes by taking such actions as demanding greater contributions from employees, reducing coverage, offering medical savings account to encourage employees to make more fiscally prudent health care choices, offering wellness programs, and self-insuring. But they acknowledged that there is little to be done on the state or regional level. Health care, they said, must be viewed as a national issue. One manufacturer pointed to the "steep hill" of health care costs as contributing to the outsourcing of U.S. jobs "because health care and benefits costs are so small in China." The loss of manufacturing jobs in the United States "is not just a wage issue." He said he has been able to offset wage increases through increased productivity, but productivity improvements have not been able to keep pace with increases in health care costs and other benefits. "My productivity hasn't been able to overcome those issues."

Representatives of the hospital industry have their own concerns about rising health care costs. Although public hospitals must operate according to national and state policies, industry representatives said most employers view health care as an out-of-control budget item. Health care representatives advocated tort reform as a measure that would help grow business, noting that annual increases in Medicaid costs of up to 10% make it “tough to cut business taxes and grow the economy.”

Energy Costs

More than half of survey respondents reported that natural gas and electricity costs are a problem for their businesses; few than 20% said energy costs are not a problem. Utilities represent a significant proportion of cost for many of Ohio’s heavy manufacturing industries. Most business leaders acknowledged that the cost of electricity in Ohio is competitive with other states, but cost increases in energy, particularly natural gas, have had a significant impact on manufacturers’ profitability. Oil and gas price increases are also driving increased costs for distribution and transportation. There is no easy solution for energy cost increases, they acknowledged. Respondents noted that deregulation would probably make things worse, not better. Energy prices were generally a more pressing subject in the northern portions of the state.

Taxes

The state’s tax system was seen by many business leaders as overly complex and burdensome; fewer than 20% considered the tax system not to be a problem. It stifles growth, business leaders said, and puts Ohio at a disadvantage with other states. When companies consider their next business investment, one panelist said, “You’re going to be penalized in Ohio. You have to go through so much government red tape, compared to other states.”

At the top of the list of tax concerns among business leaders was the tangible tax on equipment and inventory. They said the tax penalizes success, discourages investment and expansion within the state, and forces business owners to consider relocating out of the state. “How can you keep people in Ohio when they can go two states away and they don’t have to pay personal property tax?” said one business leader. Manufacturers noted that the tax affects how they think about inventory and cited the tradeoffs they have to make between carrying inventory to provide immediate customer service and the tax costs of carrying the inventory.

Even though the state may provide abatements and tax credits that make Ohio a competitive location option, the system’s complexity and lack of transparency is an impediment when businesses need to make fast-paced investment decisions. Out-of-state investors and site selectors may see Ohio’s “list price” for taxes and move on to consider another location without spending the time to understand the state’s “discounted price” after abatements and incentives. Ohio’s list price of taxes results in a “sticker shock” that eliminates the state from consideration, panelists said. Other business leaders noted the cost of complying with state tax codes and regulations, citing the need to hire more accountants.

Business leaders also cited the complex, fractured local taxing system as a problem. Some noted that Ohio’s tax structure might inhibit the attraction of top executives and their potential investment capital.

Many of the panelists' concerns will be addressed if recently proposed changes to Ohio's business tax code are enacted.

Torts and Legal Liability

Although business leaders consider health care primarily a national issue, they said the state should take action to curb the costs of lawsuits. Fear of legal liability can change the way that businesses, governments, and professionals provide goods and services, often in ways that are not consumer-oriented. Tort reform can bring economic benefits: A National Bureau of Economic Research study estimated that states adopting lawsuit abuse reforms experience employment growth, productivity growth, and growth of total output. "Until something is done about the amount of punitive damages," said one expert panelist, "we will have a problem with health care and everything else." One manufacturer estimated that trying to protect himself from legal claims costs his company about \$100,000 a year. Insurance deductibles are now \$150,000 per case, and premiums are five times what they were five years ago, he said.

One expert panelist said Ohio was experiencing a brain drain of physicians and business leaders relocating to states where there are caps on liability. A representative of the hospital industry noted that the Southwest Region, in particular, is beginning to experience a shortage of doctors. "When we're looking at recruiting neurosurgeons and surgical specialists, they're beginning to know which states have reasonable malpractice rates and which don't."

Workers' Compensation

Expert panelists throughout the state expressed concern that the workers' compensation system is biased against business owners. They noted that even when they investigate fraud and abuse, their evidence is frequently dismissed. Many cited examples of workers doing heavy lifting, hunting, or engaging in other strenuous activities away from work, but the workers' disability claims were still upheld by the judge. "You can't win. You're just trying to minimize your losses," said one panelist. Costs per employee are high, business leaders said, even for companies that don't have many claims. One noted that only a year ago his company faced a 400% spike in workers' compensation insurance fees, which the company was able to lessen by joining an alliance to manage costs. Others said recent state measures to control rising costs have helped, but they worried that the credit programs might be discontinued or lose their effectiveness.

Environmental Regulations

Most survey respondents did not consider environmental regulations a problem for their business. However, concerns about environmental regulation were greater in the Southeast, Northeast, and Northwest regions. Specific industries, such as chemicals, were also more significantly affected by environmental regulations. Specific concerns included the cost and time for permitting expansion or improvement, lack of transparency of regulations and changes, and costs and resources needed for compliance. One universal concern was that global competitors such as China do not have to comply with environmental regulations. Ohio companies are concerned that they will lose their competitiveness or that all manufacturing will move overseas, panelists said. Their recommendation, however, was not that Ohio relax its standards; they want China to adopt regulations that will help "level the playing field."

Infrastructure

On a positive note, Ohio's business leaders seem satisfied with the state's infrastructure. Although there were pockets of concerns, the vast majority did not consider electricity or wireless availability and service, roads, and railroads to be a concern. In fact, Ohio's transportation infrastructure and network is often cited as a positive factor for the state.

Economic Development Programs and Policies

Discussions with Ohio's business leaders indicate that Ohio has developed attractive incentive packages that help significantly with retention and expansion of many companies that are struggling with the state's high cost structure. For companies that understand the system and have the resources to access the benefits, Ohio's economic development programs have been beneficial, and many business leaders sang the praises of their local economic development representatives. However, Ohio's economic development resources (incentives, training programs, tax breaks, R&D) are fragmented and companies – especially smaller ones -- don't always have the resources to find or access them. Both business leaders and economic development representatives said the state's economic development programs are often not flexible enough to adapt to specific situations or needs. The process to qualify for, apply for, and receive economic development incentives in Ohio can be cumbersome and does not keep pace with today's rapid speed of business decision-making.

Other states offer highly attractive incentives bundled in packages that "make it easy" for companies, panelists said. As a result, some companies, including those with strong Ohio heritage, admitted that they frequently consider whether it would be best for them to move out of state. Loyalty to the state is often family- and heritage-based, not based on business logic.

Many economic development incentives are employment-based. Employment-based incentives tend to reward attraction of out-of-state business; however, such incentives tend to discourage in-state businesses wanting to make incremental capital investments that enhance productivity and increase output but that may not create any net new jobs. Benefits tend to be back-end loaded, but companies need benefits up front to make an initial investment possible. There is also a perception among business leaders that incentives create unfair competitive advantage when one company in an industry receives benefits from the state that its competitors do not.

RECOMMENDATIONS

This study assessed the state of Ohio’s economy and each of its six regions, emerging growth opportunities, strategic industries, Ohio’s competitiveness, and gaps. Recommendations from this analysis focus on the ways in which the state can better align its economic development policies and programs to retain, support, and expand core industries and build from that base to attract new businesses and industries.

RECOMMENDATION	STEPS
<p>Shift Ohio’s economic development approach and drive change in public policy.</p>	<ul style="list-style-type: none"> • Enhance accessibility, transparency, and speed of incentive programs. • Emphasize revenue growth and productivity within the context of employment, retention, and expansion when considering incentives. • Focus incentives on investments that increase earnings through enhanced productivity, that are consistent with regional strategies, and that complement job-creation goals. • Reconsider the structure of programs through the lens of driver industries, opportunities for growth, and possible changes in tax code. • Work to restore Ohio’s competitive position with business tax reform. • Improve the transparency and predictability of environmental regulation enforcement.

Public policy analysis indicated that taxes (specifically the tangible personal property tax); environmental regulation; and accessibility, transparency, and speed of economic development incentives are all concerns at some level for business leaders in Ohio and site selectors considering Ohio as an investment location. These are the basics that Ohio must fix to be competitive. Solving these issues will not solve all of the challenges facing Ohio’s economy, but it is necessary for establishing competitiveness.

Another step in shifting Ohio’s economic development approach is politically difficult but economically important: The state should expand incentives beyond an employment-based focus. Although economic development incentives and programs are often based on job creation, true economic growth comes from increasing revenue and output, which is frequently tied to introducing new products. For many companies, this comes from increasing their productivity. If companies grow by selling more products or services, jobs will follow – either directly from the company or indirectly through the multiplier effect. Therefore, development programs and policies should be driven by contribution to state and regional economies, not just the number of jobs created.

Although it is important that economic development incentives be targeted toward attracting new businesses to the state, they also should be used to help retain and

expand existing Ohio companies. Often, these companies may need help with productivity-enhancing investments and innovations. It is important to keep in mind that retention and expansion can be even more valuable to the state than attraction.

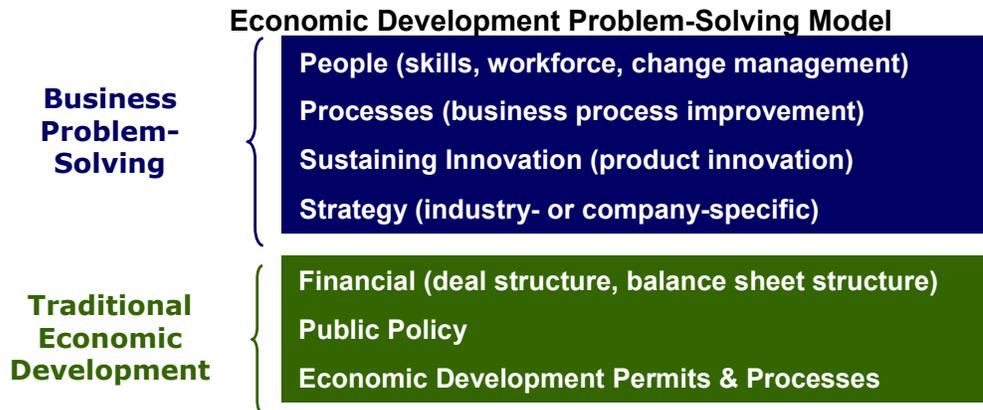
RECOMMENDATION	STEPS
<p>Strengthen the Ohio Department of Development's industry-specific expertise geared toward region-state management.</p>	<ul style="list-style-type: none"> • Establish industry experts within development organizations. • Focus the economic development process on facilitating business problem-solving. • Develop a single point of contact for each of the state's distinct economic regions. • Enhance relationships between economic development organizations and driver industries.

Ohio can establish itself as a preferred business location by building a capability or advantage in customer service. The state's economic development services and delivery mechanisms should be reconsidered from a *problem-solving* and *project management* point of view, thinking less about specific transactions and more about what business problems industries or individual companies have and how best to solve them using the resources available in Ohio. There are two major components that would help in delivering such services. The first is having economic development personnel at the state and local level who have the management skills required to shepherd long-term projects: They would understand what needs to be done in a variety of different situations and marshal the resources to take action. A regional project manager who knows the region and companies and who has a vested interest in the success of the outcome would help companies make the best investment decisions. Regional project managers would have a deep level of knowledge about critical location factors and an understanding of the region's specific areas of specialization within each industry.

Second, Ohio can become even more service-focused by establishing industry experts within economic development organizations. These experts would be familiar with an industry's key issues, supply chain, critical location factors, and other business needs. They would have in-depth knowledge of Ohio's specific capabilities and its advantages compared to other states. More importantly, these experts would proactively call on companies within the state to understand their business problems and identify resources to help solve these problems.

Customer service means that the state would be a partner with companies in solving business operational issues. An example of such service would be supporting and attracting supplier and customer chains for important driver industries. By strengthening the cluster of industries around its drivers, Ohio would build an even stronger competitive advantage. "Matchmaking" by linking companies to suppliers and customers would be another way to provide customer service and strengthen Ohio's existing companies. The state could also improve its customer service by expediting workforce training, assisting with business startups, improving transparency of incentives and public policies, and providing a regional single point of contact for Ohio's existing

businesses, as well as those interested in locating in the state. The following graphic shows the customer-service, problem-solving model for delivering economic development services. There are seven main skills. Financial, public policy, and economic development skills are those traditionally considered in an economic development context. However, Ohio would distinguish itself in customer service by adding business problem-solving skills. The state would not need to deliver all of the problem-solving services. However, the state could add value for its business customers by facilitating access to resources that help solve problems or by helping to manage projects. This model is based on knowing the state’s current and prospective business customers, understanding their key issues, and helping deliver solutions to problems.



RECOMMENDATION	STEPS
Cultivate an effective region-state dynamic that capitalizes on Ohio being a portfolio of distinct but interconnected regional economies.	<ul style="list-style-type: none"> • Provide incentives for regions to develop strategies, establish best practices, and cultivate key industries. • Co-locate state and regional economic development professionals. • Develop a model for state-regional project management collaboration.

It is important to focus on what makes Ohio and each of its regions unique and to develop a strategy to help businesses solve the problems and challenges they face. Because regional economic development organizations are most closely in tune with local business issues and attraction opportunities, it makes sense to locate state economic development professionals in regional offices. Doing so would help economic development staff better understand the dynamics of each region, define the needs of industries, and address problems.

Giving regions authority and resources to create region-specific economic development strategies and problem-solving programs that fit each region’s unique needs would be another important component of regional economic development strategy. Unless Ohio fixes region-specific issues relating to critical success factors evaluated by site selectors, there can be no unified state message.

In this scenario in which regions help lead economic development strategy, the state would make regional agencies responsible for identifying regional strengths, determining

business weaknesses, and developing a strategy for fixing weaknesses. Regional agencies would also be responsible for developing investment strategies, coordinating with the state on attraction that leverages state and regional resources, and creating a task force to better understand regional industries and areas of specialization. State funds would flow through a designated regional authority to empower the relationship.

There is a continuum of activities that should be led by the state versus those that should be led by the regions. For state drivers such as motor vehicles, which also is a driver industry in virtually every region, the state should take the lead. For region-specific drivers, such as warehousing, the region should take the lead. However, the state can and should set overall strategies and guidelines with which the regions would need to align. For industries such as chemicals, which span many regions, the state should be heavily involved, but each region would have its own specific strategies targeted at its areas of specialization. The following table summarizes how the state-region methodology could be executed for different industries.

State-Regional Model Examples

Skill Set	Auto	Chemicals/ Polymers	Logistics/ Warehousing/ Distribution
People	State with regional support	State – education Regions -- workforce, skills	Regions
Processes	State with regional support	Regions	Regions
Sustaining Innovation	State with regional support	State – Third Frontier funding Regions – link companies with resources	Regions
Strategy	State with regional support	Regions	Regions
Financial	State	State	Regions/State
Public Policy	State	State	Regions
Economic Development Permits & Processes	State/Region	State/Regions	Regions/State

RECOMMENDATION	STEPS
Develop a marketing message or brand to overcome Ohio's perception problem.	<ul style="list-style-type: none"> • Capitalize on Ohio being a portfolio of regions and industries. • Communicate the various strengths of individual regions. • Steer industries considering relocating to Ohio to regions in which the skills, resources, and industry makeup best suit their needs.

In much of the competitiveness analysis, Ohio ranked as “middle of the pack” – neither the best nor the worst place to do business. The state and its regions need to take action to establish themselves as a preferred business location. Ohio's competitive strengths can and should be used in developing focused marketing messages at the state, region, and industry level under a statewide umbrella brand to help with business attraction.

Attraction initiatives should focus on a targeted set of industries that best fit within a regional strategy based on existing drivers, resources, and skills.

Ohio's competitiveness, based on a number of site selectors' critical factors, largely varies by region. Focusing on economic development customer service and problem solving would be a way to differentiate Ohio and make it more attractive as a place to do business and make an investment. Developing marketing messages that communicate Ohio's many strengths and help overcome perception problems is important for increasing competitiveness. Effective attraction campaigns should communicate the strength of the state's supply chains for various industries to help companies understand why locating in Ohio would improve their business efficiency.

RECOMMENDATION	STEPS
<p>Focus on preserving the health of the automotive industry.</p>	<ul style="list-style-type: none"> • Focus on retaining motor vehicle original equipment manufacturers (OEMs). • Aggressively recruit foreign-based parts suppliers to establish a U.S. presence in Ohio. • Help Ohio's auto parts suppliers build a global presence. • Build deep auto parts industry expertise within ODOD.

Motor vehicle manufacturing and its supply chain drive a significant portion of Ohio's economy. These industries also consume a good deal of ODOD's resources. It is important to establish at least one expert for this industry who would focus on retention, expansion, and attraction. Because it is unlikely that a new motor vehicle manufacturer will make an investment in the state, Ohio's OEM focus should be on retention. Economic development organizations should develop relationships with Ohio's automotive parts suppliers to help them solve business problems, such as how to establish a global presence. The state should also aggressively recruit new suppliers, with a special focus on attracting U.S. investments made by foreign-based companies.

The state also should understand the underlying technologies in the motor vehicle supply chain and leverage those to expand or attract growth industries that use related knowledge. For example, precision machining capability, and possibly production capacity, could be leveraged to help design and manufacture medical instruments.

RECOMMENDATION	STEPS
<p>Cultivate growth opportunities and emerging technologies.</p>	<ul style="list-style-type: none"> • Nurture and expand existing connections between intellectual capital and commercial innovation. • Focus innovation investment in areas connected to the state’s key value chains. • Evaluate sustaining, disruptive, and formative innovation separately. • Develop programs to recruit and retain entrepreneurial talent.

Ohio’s economic history has long been driven by practical, applied innovation, and that innovation continues today. Future economic development activity and investment should keep in mind that rich tradition of applied innovation. Programs could help promote and sustain process improvement, new product development, business strategies, and operational philosophies.

Critical to driving successful innovation is the ability to leverage and nurture existing links between academic, public, and private research institutions and high-value commercial innovation connected to Ohio’s driver and growth opportunity industries and emerging technologies. Commercialization examples and opportunities include medical device manufacturing, software development, and computer services. In addition, it is important to support and strengthen university programs in chemistry and information systems to help foster technology-based development and to retain innovative talent in the state.

The state must also recognize that sustaining, disruptive, and formative innovations are different and require different skills, management tools, and evaluation metrics. Separating Ohio’s economic development services for innovation into different categories would help deliver customized service to each type of innovation and would help manage and monitor the state’s portfolio of technology investments. The state should focus on developing economic policies to benefit startups that have a high likelihood of commercial application and economic growth. One critical component of this would be strategies that help recruit and retain entrepreneurial talent in Ohio, as well as management talent with experience in running high-growth startup companies.

RECOMMENDATION	STEPS
<p>Develop long-term strategies for attracting and growing existing headquarters and division offices, and focus on promoting the state's strength in specific business functions as a means of specializing and adding value.</p>	<ul style="list-style-type: none"> • Monitor merger and acquisition activity for opportunities. • Provide or facilitate process improvement services and services to help entities adopt new technologies or automate processes. • Leverage Ohio's strength in driver industries to expand and attract companies in related industries, such as medical instruments, back-office services, or computer services. • Support growth strategies by focusing on building out customer and supply chains.

Ohio has strength in headquarters and division offices, along with strength in services and functions to support such offices. These strengths can and should be used to attract other headquarters and division offices. However, a long-term, patient approach is required because major location decisions are made infrequently. Fortune 1000 corporations rarely relocate their headquarters. Ohio's opportunity is in luring smaller growth companies or U.S. divisional headquarters of global companies. The best likelihood for success would come from focusing on companies related to Ohio's driver industries, supply chain clusters, and emerging opportunities, or those companies with existing business relationships in the state.

Hospitals are late adopters of technology, but they are now recognizing the need to improve processes and automate functions for more accurate recordkeeping and increased efficiency. The state should facilitate services or offer incentives to help services industries improve processes and adopt technologies. The state should also facilitate relationships between its driver industries and the emerging industries that support them and leverage Ohio's driver industry strengths and knowledge to expand and attract companies in related fields. For example, Ohio could use its leadership in clinical medicine and clinical trials to attract medical instruments companies, or the state could leverage its strengths in computer services and distribution to build or attract logistics companies.

RECOMMENDATION	STEPS
<p>Help small and midsized companies compete.</p>	<ul style="list-style-type: none"> • Implement programs that help businesses develop strategies for long-term success instead of simply reacting to the current squeeze of global competition and rapid change. • Help struggling industries refocus through product or process innovation. • Support MEPs and other organizations that serve smaller companies. • Align incentive and assistance programs to meet the needs of small and midsized companies.

Ohio has a rich base of small and midsized enterprises (SMEs), all of which have complex needs and are facing difficult business issues. Many of Ohio’s manufacturing driver industries have been subject to competitive pressures in recent years, which have resulted in challenges for growth and profitability. Manufacturing SMEs have been especially challenged. These companies need help with basic business blocking and tackling, such as process improvements, but also with product innovation, technology implementation, and long-term strategies. SMEs’ needs are as complex, in many cases, as those of larger organizations, but market inefficiency makes it difficult for them to access necessary assistance.

The state taking, or facilitating, a problem-solving approach to these issues should benefit these organizations tremendously, as would establishing industry experts within economic development organizations. In combination, these two forces would help the state recognize and develop solutions for SMEs. Programs such as Manufacturing Extension Partnerships and the product development pilot program of the Third Frontier are important to help close the gap in consulting services available to SMEs and improve their competitiveness. By better understanding the needs of SMEs, the state would be able to recommend an expansion of the type of services offered by MEPs or the industries to which MEP services are offered.

GAP	RECOMMENDATIONS
<p>Strengthen education within the state to meet industry needs.</p>	<ul style="list-style-type: none"> • Build university strength in applied chemistry and technology development with true industry partnerships and standards. • Extend undergraduate cooperative education and internship programs to graduate levels. • Support professional master's degrees in sciences related to Ohio's industrial strengths. • Fund nondegree supplemental training for skills needed in driver industries. • Build on community college and career centers to develop technical skills. • Sustain world-class basic chemistry skills and research. • Work with elementary and secondary schools to enhance soft skills for entry-level workers.

Although this study did not focus on labor issues, a number of concerns were raised through the expert panels, online survey, and perception studies. Two ways to help Ohio's employers would be to focus and fund state programs for incumbent worker training and establish programs that develop technical and other skills needed by today's employers.

There are three challenges that the state must address in its workforce development policies:

1. Recognize that replacing retiring workers, not adding net new jobs, will be the primary challenge for the next 10 to 15 years.
2. Understand that Ohio, and the nation as a whole, faces a soft-skills crisis in its low and semiskilled workforce. Soft skills are as important as literacy and numeracy and are not being taught and reinforced in many of Ohio's households.
3. Respond to public policy problems that inhibit incumbent workforce training: State support for technical training that reflects industry standards or is industry certified is largely nonexistent outside of formal degree-granting programs. Currently, only the six community colleges with access to property tax revenue or the regional vocational schools with access to local or county funding have the flexibility to subsidize this type of training.

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