Automotive Strategies for Wayne County

A Report for
Wayne County Department of Jobs and Economic Development

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Acknowledgments

The participating respondents from Wayne County's world class automotive industry have willingly contributed their time and expertise to outlining the tasks ahead for Wayne County's public institutions in education and jobs development. The statements and conclusions contained in section III through V of this report indicate an unequivocal desire to improve the local business climate of Wayne County's automotive industry. We believe that this desire reflects a strong commitment on the part of these firms to continue their successful tenure at the very heart of today's world auto industry—Wayne County.

This report is the product of a true partnership. It represents the combination of the efforts and contributions, made over the period of twelve months, of over 100 executives and staff members of over fifty Wayne County automotive firms. Many of the participants are employees or managers of active adversaries in today's highly competitive world automotive industry. OSAT and the Wayne County's Department of Jobs and Economic Development deeply appreciate the generous contribution of these participants' valuable time and expertise. Their intentions in regard to this study were always focused on what is best for the automotive industry and the people and communities of Wayne County.

We must acknowledge the efforts and contributions of our OSAT support staff. In particular, Diana Douglass contributed in a major way to the logistic coordination of the overall project and took total responsibility for the very difficult task of creating the report document. Wendy Barhydt, as always, contributed her valuable experience and time in many ways—especially in the initial editing of the various sections of the report. We would also like to express our appreciation for the contributions, in data and time, given by the Bureau of Research and Statistics at the Michigan Employment Security Commission, and the for the valuable guidance provided by the administrators of Wayne County's School-to-Work Program. We would finally like to thank Wayne County's Department of Jobs and Economic Development for the opportunity to carry out this project and wish them the best in their future efforts to improve the economic fortunes of Wayne County.

-The Authors

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Executive Summary and Conclusions

Automotive Strategies for Wayne County, is a large and complex study. This is a reflection of both the size and nature of Wayne County's automotive industry and the challenges the county and industry must face together. There was a time, covering much of automotive history, when Wayne County could claim it was not only the center of the world's auto industry, but that the county actually contained most of it. Today, the automotive industry in Wayne County is only a part of a new, emerging and still rapidly growing world motor-vehicle industry—the largest manufacturing industry on earth. However, Wayne County's automotive firms—vehicle and parts makers, engineering services and toolmaking firms, and their employees still hold an undeniably critical place in the future of the world auto industry.

This report contains five separate, yet related, studies of the present and the near-term future of Wayne County's auto industry. The study begins with an examination of recent automotive employment and earnings trends. The study's introduction also contains special comparative analyses of Wayne County's automotive economy and economics of other, similar U.S. counties, and also with other automotive counties. The second section of the study offers an unique matching of the structure of Wayne County's current automotive economy with critical, emerging automotive technology trends identified in the Office for the Study of Automotive Transportation's (OSAT) *Delphi VIII Forecast of the North American Automobile Industry.*

Sections III and IV of this report contain a discussion on the development of automotive skill initiatives and education programs in Wayne County. Information for these two sections was gathered through focus interviews, directly by Wayne County's three vehicle producing firms, and a representative group of auto parts suppliers. Finally, the report ends with discussion of the results of a survey of Wayne County automotive facilities that contains both their ratings of Wayne County's business climate, in eight separate areas, and ranking of these areas in terms of importance for future county policy.

The remainder of this summary presents a listing of this report's major findings and recommendations.

Wayne County Automotive Trends and Comparative Analysis

- Wayne County employment in the major automotive manufacturing industry sector (transportation equipment manufacturing (SIC 37)), tracked by the MESC, declined by about 47 percent during 1978-1995. Employment in transportation equipment manufacturing totaled almost 93,000 in 1995, or about 13 percent of total private employment in Wayne County.

- OSAT developed a special listing of 411 Wayne County automotive facilities. The listing, *Wayne County's Automotive Endowment*, included non-manufacturing research and development and engineering services facilities, as well as tool and die and prototyping shops not usually included in SIC 37. Total employment during 1994-1995 for the 411 facilities was 121,490, or about 17 percent of total Wayne County private employment. The 63 Big Three facilities accounted for almost 94,000 of these jobs, or about 77 percent of Wayne County's total automotive employment.[1] Independent auto parts production facilities account for almost 21,000 jobs, or 17 percent of auto employment. The remaining 16,000 jobs were located in the independent toolmaking and engineering services areas of the automotive industry.

- Wayne County's share of Big Three employment is still impressive. The Big Three employed 288,000 in all of Michigan in 1994. Wayne County's share of this total was about 32 percent, and for one of the companies (Ford), Wayne County's share of Michigan employment actually reached 66 percent. Big Three total employment in the United States in 1994 came to about 705,000 in automotive and non-automotive operations. Worldwide employment for the three companies in 1994 reached 1,143,000. Wayne County's share of Big Three U.S. employment, then, was about 13 percent, and its share of the worldwide figure was about 8 percent. Although these percentages have been higher in the past, certainly no other community can match the county's share of Big Three employment and earnings.

- Wayne County's share of a recent Michigan Jobs Commission forecast of Big Three hiring through 2003 would total about 3,900 of the 12,000 Big Three annual Michigan hires.

- Wayne County's economy was compared with the economies of 19 similar, large urban counties in terms of economic performance during 1969-1993. Wayne County ranked twelfth in 1969 in terms of personal income per capita. In 1993, Wayne County ranked last in terms of this economic measure. However, Wayne County maintained its ranking of fourth across the counties in terms of manufacturing earnings per capita, and first in earnings per capita derived from motor-vehicle manufacturing. Although the share of county total earnings per capita attributed to automotive manufacturing fell during the period, Wayne County's automotive earnings were five times the level of its closest large county competitor, St. Louis, MO.

- Wayne County's fall in per-capita personal income can be partially attributed to its poor performance in nonautomotive manufacturing. Earnings for the county in non manufacturing also grew slowly during 1969-1993, in such sectors as finance, and business, and professional services. In contrast, compared to other

[1] The fact that Big Three employment is 94,000 and SIC 37 employment is 93,000 is purely coincidental.

large U.S. urban counties, Wayne County performed well in terms of growth in automotive earnings during 1969-1993.

- Wayne County's performance in automotive earnings was also compared with the 25 other U.S. counties with the most earnings from motor-vehicle and equipment manufacturing in 1993. Compared to these counties, Wayne County's performance in terms of growth in automotive earnings during 1969-1993 was at or below average. Finally, a list of the fifty U.S. counties with the highest per capita automotive earnings in 1993 shows a clear pattern in automotive location and relocation during the period. The fastest growing counties on the list are almost exclusively small (in population) southern and midwestern counties that possessed little automotive activity in 1969.

Recommendations from this initial automotive-trends section of the report naturally arise from the findings. Wayne County's automotive economy is atypically dominated by the Big Three. Previous research performed by OSAT on the subject of U.S. automotive employment indicates that the Big Three now account for less than a third of total U.S. automotive employment, yet their share of Wayne County's total auto employment is 77 percent. Since Big Three employment as a share of total automotive employment continues to decline, Wayne County (and the State of Michigan) must quickly develop a set of policies to improve its attractiveness to independent automotive suppliers.

Wayne County's poor performance in the private nonautomotive sectors of its economy clearly underlines a strong need for attention (similar to this report) in these areas.

Finally, the strong performance of small rural counties in terms of attracting automotive employment and earnings in recent years poses several critical questions and challenges to Wayne County. The advantages that these rural counties seem to offer to automotive firms must be determined (and hopefully matched or countered). Also, the question of the general use of federal and state economic subsidies for business attraction, possibly to the general detriment of large, urban counties such as Wayne County, must be investigated. Despite the fact that existing regulations would appear to prohibit the use of many subsidies for purposes of mere relocation of employment, it could be true that they often used for *just* this purpose -- especially by so-called new automotive firms.

Delphi Opportunities -- Emerging Automotive Trends and Wayne County

Wayne County Endowment

The Office for the Study of Automotive Transportation has divided Wayne county's automotive endowment into 17 categories. These include 12 vehicle component systems, one parts not elsewhere classified, vehicle assembly, tool and die, engineering and research and development firms, and Big Three nonmanufacturing operations

- Although Wayne county has experienced a significant amount of Big Three facility shutdowns in the past twenty years, the county still maintains a significant amount of core Big Three facilities. The county has eight assembly plants, five engine plants, and two transmission assembly facilities. Combined, these facilities account for nearly 40,000 jobs. the County accounts for nearly 41 percent of Michigan's, and 29 percent of total U.S. Big Three white collar employment. This large concentration of employment is primarily attributed to Ford. The Ford Motor Company continues to maintain a majority of its North American administration and engineering staff in Wayne County. General Motors recent purchase of the Renaissance Center, and subsequent announcement regarding plans for the complex confirms that GM will increase its presence in Wayne County.

- There are 104 independent part supplier facilities in Wayne county. This count does not include supplier headquarters, which were not identified for this study. Therefore, the employment figures represent a proxy for manufacturing employment at supplier facilities in Wayne County. Approximately 29 percent (33 percent by employment) of the part and component facilities are interior/comfort convenience related and 26 percent (42 percent by employment) are powertrain related.

- The county has 220 tool and die, prototyping, and special tools shops. These facilities range in size from small family owned and operated operations employing fewer than five people to large full service tool and die suppliers with several hundred employees. These facilities, although in the same category, are indeed as different as their varied size and capabilities. They also face significant challenges in the coming decade. The progress shown in virtual prototype engineering and development may lead many of these companies to face significant changes.

- The Engineering Service firm segment presented great difficulty in defining. There is limited information on the depth and breadth of this sector. The Big Three have strongly committed to reducing engineering staffing levels, and are increasingly relying on contract and service firm employment as a buffer.

Delphi Opportunities for Wayne County

The Office For the Study of Automotive Transportation's Delphi VIII is a detailed analysis of forecasts by three separate panels of automotive industry executives, directors, managers and engineers who are expert in automotive technology, materials or marketing. These individuals were selected because they occupy positions of responsibility within the automotive industry, and have strategic insight into important industry trends. The Delphi VIII is the eighth in a series of in-depth studies of long range automotive trends, which began with Delphi I in 1979. The forecast is composed

of three volumes, Marketing, Technology, and Materials with individual panels for each volume.

Section II contains information from the Delphi VIII forecast, supplemented with another OSAT publication, the *Vehicle, Engine and Transmission Timing Charts*, to assist Wayne County in developing an awareness of industry trends. It will also begin to develop a strategy to allow the county to proactively respond to these trends.

- No longer does Wayne County compete only with other counties or states for new automotive investment. The automotive industry is truly global. Decisions on investment location may include sites in other parts of North America, and even other parts of the world. Therefore, it is essential that the County keep abreast of Big Three sourcing strategies. The Delphi VII Marketing panel rated the perceived risk in terms of U.S. component and subsystem production loss due to the North America Free Trade Agreement. Panelists rated vehicle assembly, engine and transmission, and body/chassis no worse than moderately at risk for increased Mexican sourcing. Such a rating is encouraging, given the number of such facilities in Wayne County.

- The county has 17 engine component facilities, employing approximately 2,500 persons. This sector could see significant change in the coming decade. The desire to improve fuel economy by using more lightweight materials will continue to be challenged by the need to reduce cost. Engine materials that can reduce weight, while still achieving cost targets will likely see increased penetration.

- Although the Delphi VIII panel does not forecast a major shift to alternative fueled vehicles in the coming decade, it does expect continued developmental activity. In an attempt to lessen the economic impact of reduced government defense spending, the state of California has actively promoted the development of electric vehicles in southern California. This is a direct challenge to southeast Michigan for future leadership of the automotive industry.

- It is likely that Wayne County will not see increased growth in manufacturing of interior components, but may be positioned to gain increased technical and managerial employment from interior component suppliers. As these systems integrators acquire production capabilities--usually by purchasing existing part suppliers--plants, management, and engineering staffs will be consolidated. Labor cost will likely be a major determinant in plant closure decisions. However, management and engineering will likely be located in southeastern Michigan.

- Delphi panelists expect the vehicle development process will take approximately 13 months less in 2005 than it does currently. Advances in computer-aided design, engineering, and manufacturing will reduce the total resources required to execute a program by changing the way companies develop vehicles (figure II.3). To emphasize the potential importance of this change, Ford recently announced the layoff of 6,000 contract engineers, and a plan to reduce

prototypes by two-thirds. If virtual prototype engineering becomes a reality, special tool and prototype building may become akin to the buggy and whip industries. Conversely, core engineering skills such as systems software and computer aided engineering will become more critical.

- Engineering service firms will also be affected by virtual prototype engineering. Virtual prototyping has the potential to greatly reduce the number of engineers required to develop a vehicle, therefore engineering service firms and supplier research and development activities may see decreased activity in the future. However, as with many new technologies, the effects may not fully be realized for several years. And the new skill set required may present an opportunity for proactive educational systems.

- All businesses will be required to assure that the skills noted are present and current in their organizations in order to be competitive in an increasingly competitive global market. The educational system must be ready to provide up-to-date ongoing education in all of the areas mentioned. Automotive-industry-defined school-to-work issues are reviewed in section III of this report. However, it is important for Wayne County to develop a parallel program in work-related education and training. As the Delphi respondents point out, industry will be changing at such a rapid rate, employees will be forced to update their skills on a regular basis. Work-related education and training of the future will no longer be only for the underemployed, but for all of those that wish to remain gainfully employed.

Automotive Skill Initiatives - Big Three Consensus

- OSAT interviewed a select group of Big Three automotive executives currently assigned to participate and interact with both public and private school-to-work, or automotive skills and education initiatives.

- Our general findings included strong statements by all three firms about the critical, competitive importance of improving the general quality of their applicant pool for production positions. Wayne County K-12 graduates, however, were thought to compete effectively with students elsewhere in Michigan. Yet, this may merely indicate that Wayne County currently shares with the rest of nation the same inadequacies of work-related education in the eyes of many employers.

- Big Three interaction with local school systems is underway and developing rapidly. Various communication links have been established and at least one major curriculum Ford Academy of Manufacturing Sciences (FAMS), meant for implementation in Wayne County, has been developed.

- All three companies are excited by the prospect of an evolving school-to-work consensus in Wayne County, which should result in a meaningful and unique

partnership between industry and education. One automaker strongly emphasized the practical and strategic role that must be played by autoworker union locals in any real world school-to-work program located in Big Three facilities.

- A practical design for automotive school-to-work appears to be in the works. Effective "awareness" programs that list automotive opportunities and the need for the development of basic skills will be offered to grade and middle school students. These programs will then be followed by a coop/intern program for 11th and 12th graders that revolves around a core curriculum such as FAMS. A full, equal partnership with local unions must be carefully developed if these programs involve Big Three facilities.

Specific recommendations for Wayne County include a request for strong support by the county for transportation of students to and from Big Three facilities—even across county boundaries. Many excellent, existing, automotive-skills programs were identified in Wayne County. The key elements of success demonstrated by these programs listed by our interview respondents included the following features:

1. an emphasis on the complete mastery of a core curriculum
2. a strong awareness and emphasis on applied manufacturing technology—backed by sufficient investment in these technologies
3. a committed and motivated faculty—capable of imparting critical behavioral skills to students, partially through personal example
4. meaningful internships with automotive employers as an integral parts of the program
5. a strong two-way information flow between industry and education regarding not only the needs of employers but critical industry change
6. active and equal involvement of the local plant union leadership and membership

Automotive Skill Initiatives - Automotive Supplier Consensus

- Six representative Wayne County automotive supplier firms were interviewed by OSAT about the same skills and education issues that were covered in the Big Three interviews. Those interviewed included CEOs and human resource managers directly responsible for company hiring. In general, Wayne County automotive suppliers were less satisfied with the general quality of Wayne County's applicant pool than were the Big Three. To a certain extent, this could be attributed to wage differences between the two sectors of the industry, which may result in different experiences in terms of applicants. However, relative to the Big Three, Wayne automotive suppliers have been more active in hiring and interviewing applicants over a longer period of time.

- Suppliers identified four types of skill categories in their interviews: employability, traditional academic, modern workplace, and manufacturing knowledge skills. Of the four categories, employability skills or behaviors were by far considered the most important and the most difficult to impart. Suppliers tended to distribute blame for the poor performance of Wayne County students to both the inadequacies of the educational system and to poor socialization or family discipline.

- The suppliers interviewed for this study have all interacted (three of the firms to a great extent) with local school systems in Wayne County. However, the respondents reported that this was not generally true for many small suppliers and automotive tooling firms. Many educators, it was also noted, have also failed to communicate with industry regarding practical needs. The suppliers urged the further development of communication forums and other linkages to bring employers and educators into closer contact and to bring about a greater awareness.

- The six suppliers hold modest expectations regarding the future potential of school-to-work programs in Wayne County. The suppliers recommend early grade school awareness programs that allow students to explore a wide variety of career choices and also to communicate the potential rewards that can accompany skill training. Basic school-to-work programs in later grades should focus on providing the fundamentals of the four distinct skill categories.

- The suppliers also rated current vocational education as often dated and under equipped with even the most minimal technology. A strong investment in traditional vocational and technical education, in terms of information and equipment, could do much to improve the quality of Wayne County graduates. Finally, a true coop program must commit to a common set of useful standards and skills such as the rapidly developing FAMS program.

The suppliers noted that a number of districts contain excellent programs that could certainly serve as models to the other districts. Several key elements of success stated by suppliers included the use of teacher internships in manufacturing, and a strong emphasis on discipline in any program directed toward education for industry. Finally, all supplier respondents pleaded for the dissemination, and even the marketing, of information about the highly competitive nature of the industry and its current needs for quality labor.

Benchmarking Wayne County's Automotive Business Climate

Our survey of Wayne County's automotive business climate accomplished three objectives. First, the survey measured current attitudes towards local business climate conditions held by significant respondents at Wayne County automotive facilities. The survey also gathered information from Wayne County automotive respondents as to which business climate areas of the County required the best focus of its policy efforts. Finally, the survey provides a first, informed step in the development of an economic development instrument to collect specific information regarding Wayne County's business climate and policy performance in the eyes of its major automotive customers.

- A questionnaire was developed for this survey that covered nine critical areas of business climate that have been identified in past OSAT research as most important to automotive facilities. The questionnaire was mailed to 186 of the 411 automotive facilities listed in this report's directory: *Wayne County's Automotive Endowment*. Forty-four of these facilities responded to the survey, for a response rate of about 23 percent. The average responding facility employs 406, and has been operating in Wayne County for 23 years.

- On a five-point scale, the average rating for the nine climate areas was 3.18, where one was labeled "excellent": and five is "poor." The best average rating for an individual climate area was that for Freight Transportation (rating = 2.68). The next two highest ratings of business climate areas were a tie (rating = 3.0) for Environmental Laws and Utility Costs. The worst, average rating was that for Subsidies (rating = 3.67). The next two worst climate areas were Public Safety/Legal climate (3.43) and Performance of Public Education (3.38).

- Respondents were asked to check the most critical issues for their facility from a list appended to each of the nine major business climates. Typically, respondents either chose one issue as most critical or there was a virtual tie between two or even three issues. An example of a single dominant issue appeared for the climate issue, Utility Rates. No less than 91 percent of the respondents checked electricity rates as a critical issue—far beyond the next closest issue, Water and Sewage rates at 50 percent. Two labor quality issues virtually tied in terms of the frequency of being checked as critical. The availability of skilled trades applicants was checked by 66 percent of respondents and the Availability of Applicants for Engineering/technical positions was checked at almost the same level, or 61 percent.

- Finally, respondents were also asked to prioritize the nine policy/business climate areas in terms of where they believed Wayne County should best focus its policy efforts. There was a virtual tie for highest priority between business and property taxes and labor quality and availability. These two climate areas hold a commanding and significant lead over the next highest priority area, the

performance of public education. The climate areas with the lowest priority rankings were consistency of county economic policy and freight transportation.

A major success of the first Wayne County Automotive Business Climate Survey was the performance of the questionnaire. Respondents clearly indicated their happiness with the current climate for freight transportation in Wayne County, but were less than happy with the county's litigation climate and the performance of public education. Also, the respondents clearly ranked, with unquestioned significance, the two highest priority policy areas for Wayne County automotive facilities: taxes and the availability of quality labor. In fact, respondents at smaller facilities, especially those that produce automotive parts, also ranked the performance of public education above taxes as a policy of the most critical importance for future county initiatives.

I. Introduction

Wayne County, Michigan, can make greater claim than any other region to the title, "Birthplace of the American (and perhaps even the world) automotive industry." Wayne County—including the cities of Detroit, Highland Park and Dearborn—has a century of experience with the automobile, including 96 years of activity in and frequent domination of the mass manufacturing and design of motor-vehicles. The pattern of work and life in Wayne County has been heavily influenced by every significant development in the motor-vehicle industry, including rapid internationalization and the many related challenges of globalization over the past 30 years. Despite these challenges, Wayne County still contains the largest and most diverse regional automotive sector in the world today.

This study is meant to provide the research and collect the information necessary to formulate a comprehensive future automotive strategy for Wayne County government. The focus of this study is on the future of the industry within the county. The Office for the Study of Automotive Transportation (OSAT) has been charged to identify the most strategic, near-term developments of greatest potential impact upon Wayne County. Such developments or challenges would include likely changes in the vehicle of the future and the technologies used to produce it. They also include special challenges in the area of automotive human resources that will dominate industry employment and training over the course of the next decade. Finally, this report provides Wayne County with guidance and feedback in the area of economic policy or business climate conditions directly from the automotive customers themselves.

In order to carry out this research mission, OSAT has produced five separate yet interrelated research projects within the confines of this single overall study. All five are designed to provide Wayne County with the information and the networks needed to create an automotive development strategy that no other economic regional entity can hope to attain in the foreseeable future. The following represents a description of the five research projects which constitute the balance of this study.

1. *Country Automotive Trends and Comparative County Analysis*

OSAT commissioned the University of Michigan's Institute of Labor and Industrial Relations (ILIR) to describe trends in Wayne County's automotive employment, education base, wage trends and automotive production. ILIR was also asked to carry out a special comparative trend analysis of employment trends in major industries for 20 major U.S. counties that are most similar to Wayne County in terms of population size, economic structure and regional patterns. An additional comparative trend analysis was performed by ILIR that identifies the fastest growing "automotive" counties in the United States.

2. Delphi Opportunities—Emerging Automotive Trends and Wayne County

A critical strategic planning product for this study is the matching of Wayne County's automotive endowment with emerging automotive trends as identified in OSAT's recently published *Delphi VIII Forecast of the North American Motor Vehicle Industry.* This major research product measures detailed change in automotive technologies, materials and markets through 2005. Over 300 North American automotive executives were surveyed on their predictions for the next 10 years. OSAT has identified the most critical of the changes forecast by the Delphi participants. OSAT's Wayne County automotive directory of 411 facilities has been coded into 17 *Delphi* VIII—related technology, market and component segments. These segments are matched against *Delphi VIII* trends for a detailed analysis of opportunities and critical future changes for Wayne County's automotive industry.

3. Automotive Skill Initiatives - Big Three Consensus

OSAT arranged to interview a select group of Big Three (General Motors, Ford, Chrysler) automotive executives currently assigned to participate and interact with both public and private school-to-work programs, and automotive skills and education initiatives. These executives were located in the human resources and government affairs areas. The interviews were broadly structured to elicit the most practical designs, from the point of view of the motor-vehicle producers, for public skills programs and initiatives. A full description of current corporate efforts and intentions was obtained. Current successful programs in Wayne County were identified. Perhaps of most importance, the characteristics of success for educational programs targeted toward the automotive industry were identified. A consensus document was developed and resubmitted to the participants for comment and final review. An important element of this product was a thorough briefing and review of Wayne County's current school-to-work efforts gained from a scheduled interaction with the County's current school-to-work director.

4. Automotive Skill Initiatives - Automotive Supplier Consensus

The Office for the Study of Automotive Transportation interviewed six representative Wayne County automotive supplier firms on the subject of public and private school-to-work programs, and automotive skills and education initiatives. The target interview subjects were company chief executives and their human-resource managers. As was the case for the vehicle producers, the interviews were broadly structured to elicit the most practical designs, from the point of view of automotive suppliers, for public skills programs and initiatives.

5. Wayne County Automotive Business Climate Survey

OSAT carried out a mail survey of a sample of Wayne County automotive firms and facilities. The survey asked Wayne County automotive firms to rate their current business climate in

Wayne County and to prioritize Wayne County's potential policy efforts to improve the county's automotive climate. This survey is experimental in its focus on one regional industry and is meant to provide the county with a benchmark to measure future progress. A special OSAT-generated listing of 411 Wayne County automotive facilities was developed for the survey and for the additional descriptive analysis described above. This list constitutes OSAT's determination of Wayne County's current automotive endowment.

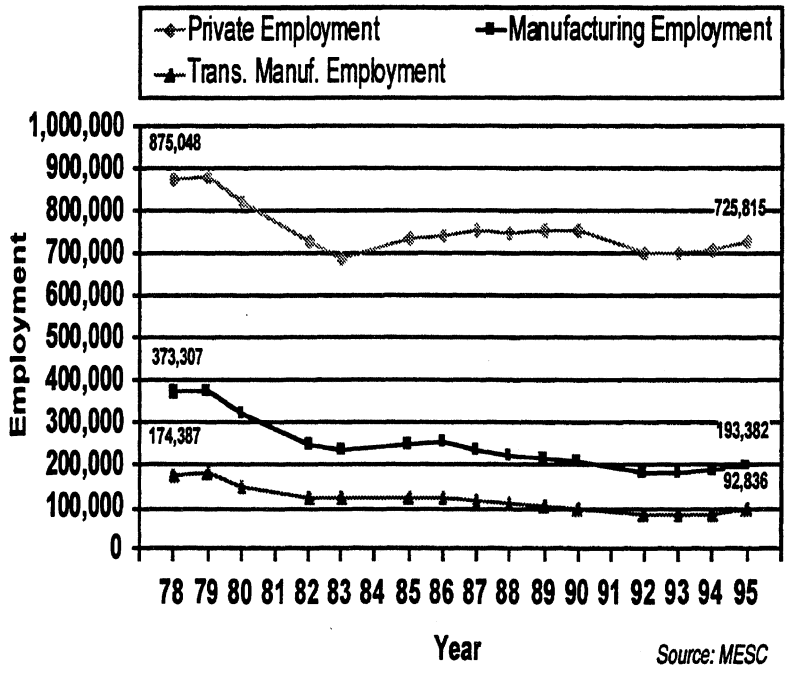
A. Recent Automotive Trends in Wayne County

A natural starting point in any examination of automotive trends in Wayne County is employment. A time series for Wayne County annual employment levels by major industry sector was acquired from the Bureau of Research/Statistics of the Michigan Employment Security Commission (MESC). Chart I.1 shows employment trends in three large employment sectors for the period 1978-1995. Private sector employment totaled 875,048 in 1978, a level that seriously declined in the recession of 1980-1982. A mild pattern of recovery in private employment during the mid-1980s was somewhat offset by the recession of 1990-1992, but has once again emerged in recent years. Current 1995 total private employment was 725,815. Total Wayne County private sector employment, then, fell by about 149,000 during 1978-1995, or by 17 percent.

The long-term trend in Wayne County manufacturing employment was somewhat more serious. As shown in chart I.1, a 1978 a manufacturing employment total of 373,307 declined to a level of 193,383 by 1995. Manufacturing employment fell by about 180,000 during 1978-1995, or by 48 percent. Since total private sector employment fell by 149,000 during period, it is apparent that the entire decline in private sector employment was located in manufacturing. Non-manufacturing, or service-producing, employment actually grew during 1978-1995, perhaps by over 30,000 jobs—a pattern experienced in a number of other U.S. regional economies in recent years.

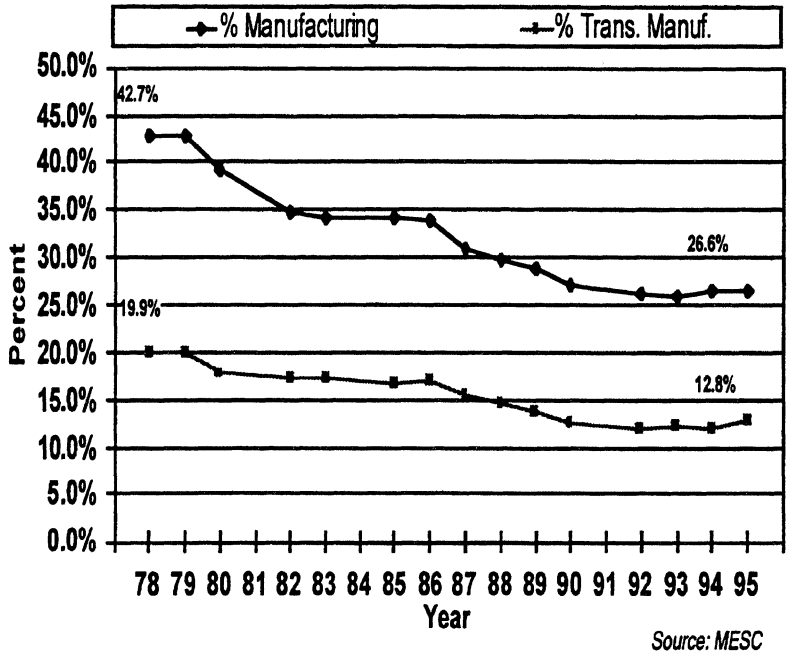
Chart I.1 also shows Wayne County 1978-1995 employment in the manufacture of transportation equipment. Employment in transportation manufacturing fell from a level of 174,387 in 1978 to 92,836 in 1995, or by about 47 percent. The large percentage decline in transportation equipment and overall manufacturing has reduced the share of these sectors in Wayne County's economy. This is clearly illustrated in chart I.2, which indicates that manufacturing share of total private county employment fell from about 43 percent of total private sector employment in 1978 to less than 27 percent in 1995. Employment in transportation equipment manufacturing accounted for almost 20 percent of county private employment in 1978 but less than 13 percent in 1995.

CHART I.1
WAYNE COUNTY PRIVATE AND MANUFACTURING EMPLOYMENT



Source: MESC

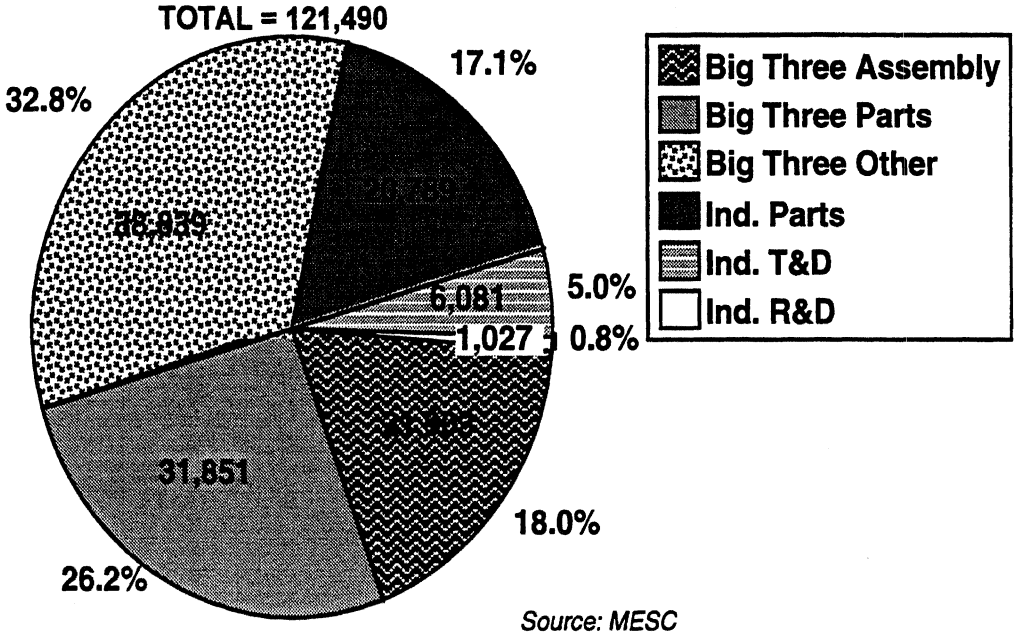
CHART I.2
MANUFACTURING SHARE OF WAYNE COUNTY PRIVATE SECTOR



Source: MESC

A special endowment listing of 411 Wayne County automotive facilities was produced for this study. A full description of this information source is given in section II. However, some initial results from this description of Wayne County's automotive economy are useful in this initial discussion of trends. As shown in chart I.3, the 411 automotive facilities, some of which were located outside of manufacturing (e.g., research and development), reported a total of 121,490 employees in 1994-1995, or almost 17 percent of total county private employment. The OSAT total is larger than the MESC total for transportation manufacturing because the endowment listing directly includes operations outside of SIC 37 such as tool and die/prototype manufacturing, automotive stamping and engineering services.

CHART I.3
WAYNE COUNTY AUTOMOTIVE EMPLOYMENT
TOTAL = 121,490



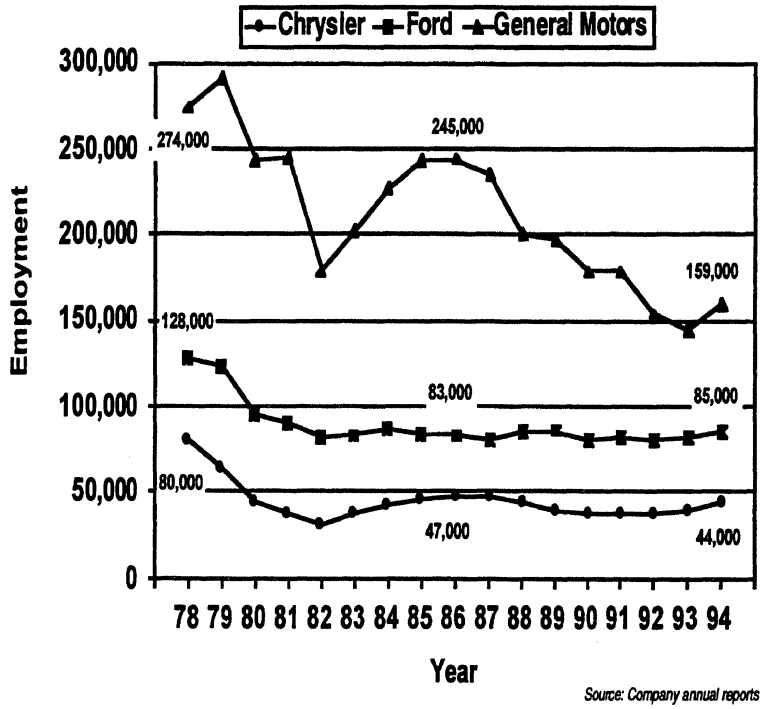
Source: MESC

A striking feature of this OSAT-produced estimate of Wayne County automotive employment is the fact that the 63 identified Big Three (General Motors, Ford and Chrysler) facilities accounted for 93,593 employees, or 77 percent of total County automotive employment. Independent auto parts producers accounted for an additional 104 facilities that employed 20,789 employees, or 17 percent of automotive employment in Wayne County. Finally, 244 tool and die, prototyping and independent research and development facilities were identified that employed a total of 7,108, or only 6 percent of Wayne County automotive employment.

Wayne County's share of Big Three employment is still impressive. As shown in chart I.4, the Big Three employed 288,000 in all of Michigan in 1994. Wayne County's share of this total was about 32 percent, and for one of the companies (Ford), Wayne County's share of Michigan employment actually reached 66 percent. Big Three total employment in the United States in 1994 came to about 705,000 in automotive and non-automotive operations. Worldwide employment for the three companies in 1994 reached 1,143,000. Wayne County's share of Big Three U.S. employment, then, was about 13 percent, and its share of the worldwide figure was about 8 percent. Although these percentages have been higher in the

past, certainly no other community can match the county's share of Big Three employment and earnings.

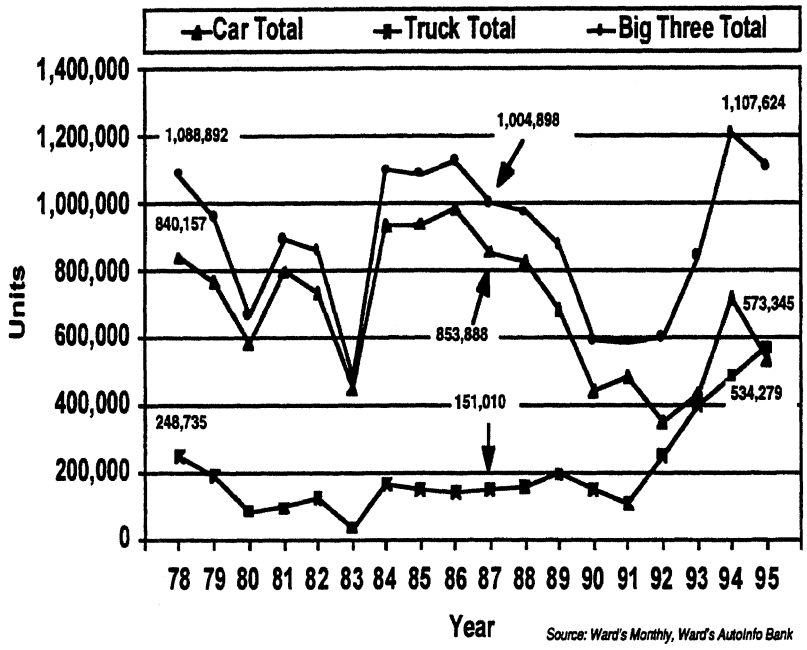
CHART I.4
BIG THREE MICHIGAN EMPLOYMENT
1978 - 1994



Source: Company annual reports

About 22,000 Big Three employees work in Wayne County vehicle assembly plants. The Big Three employed 148,847 in their U.S. assembly plants in 1994, including 52,280 in Michigan that year. Thus, Wayne County's share of U.S. assembly employment was about the same (14 percent) as its share of Big Three U.S. employment, but it had a proportionally larger share of Michigan assembly employment compared to its share of overall Michigan Big Three employment. Indeed, chart I.5 shows that in one area, vehicle assembly, Wayne County's automotive sector has fully recovered since 1978 and has even adjusted for changes in the automotive market of the 1980s and 1990s.

CHART I.5
BIG THREE VEHICLE PRODUCTION:
WAYNE COUNTY 1978 - 1994



Wayne County assembly plants produced a total of 1,107,624 vehicles in 1995, a larger total than the previous peak year of 1978 (1,088,892). What is even more impressive is that 52 percent of Wayne County production was concentrated in light and medium truck vehicles compared to only 23 percent in 1978. Light trucks alone constituted 45 percent of total U.S. motor-vehicle sales in the first three months of 1996—far and away the most profitable component of total world automotive sales. Wayne County's current position in vehicle assembly couldn't be better suited to the most important trends in today's market for motor-vehicles.

What is Wayne County's current relative position in automotive wages? Charts 1.6 and 1.7 yield some current evidence on the county's changing position in relative assembly and parts production wages and salaries. Chart I.6 compares trends in average annual wage and salary compensation for employees in SIC (U.S. Department of Commerce (DOC) Standard Industrial Classification) 3711, or motor-vehicle assembly for Wayne County, Michigan, and the United States. Employees who assemble, design or administrate the production of motor-vehicles are covered by this series. As indicated, Wayne County employees in this area of automotive production were paid 23 percent more than the national average in 1988, a premium that fell to 18 percent by 1994. It is presumed that Wayne County's earnings premium in assembly production was higher throughout the period due to a higher proportion of executive compensation in Wayne County than that paid nationally to SIC 3711 employees. Since higher levels of overtime were paid to actual assembly workers by 1994, this ratio fell correspondingly.

In contrast, chart I.7 depicts earnings compensation for workers in the largest auto parts industrial classification, SIC 3714, where Wayne County parts manufacturing employees were paid 51 percent more than parts workers nationally in 1988, and a similar 52 percent premium in 1994. The large premium paid to Wayne County parts employees throughout the period cannot be attributed to the same differences in executive compensation as in the case of SIC 3711. This high relative earnings disparity is a disturbing trend in the competitiveness of auto parts production in Wayne County.

CHART I.6
VEHICLE MAKER, AVERAGE ANNUAL WAGES (SIC 3711)
WAYNE COUNTY VS. MICHIGAN VS. UNITED STATES
1988-1993

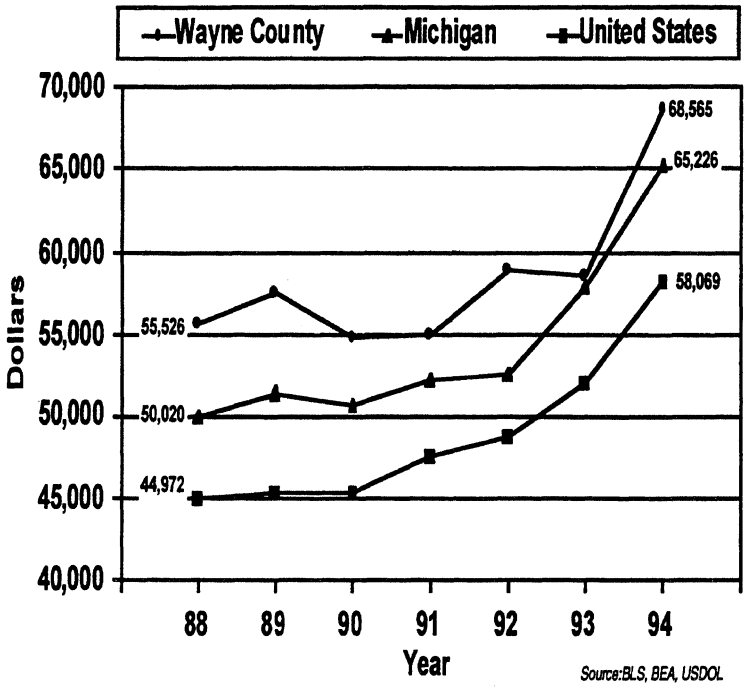
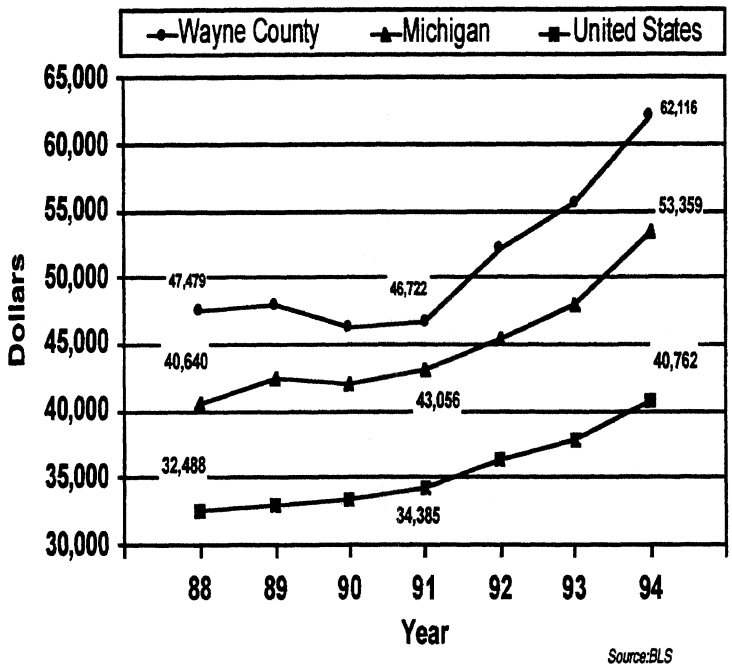


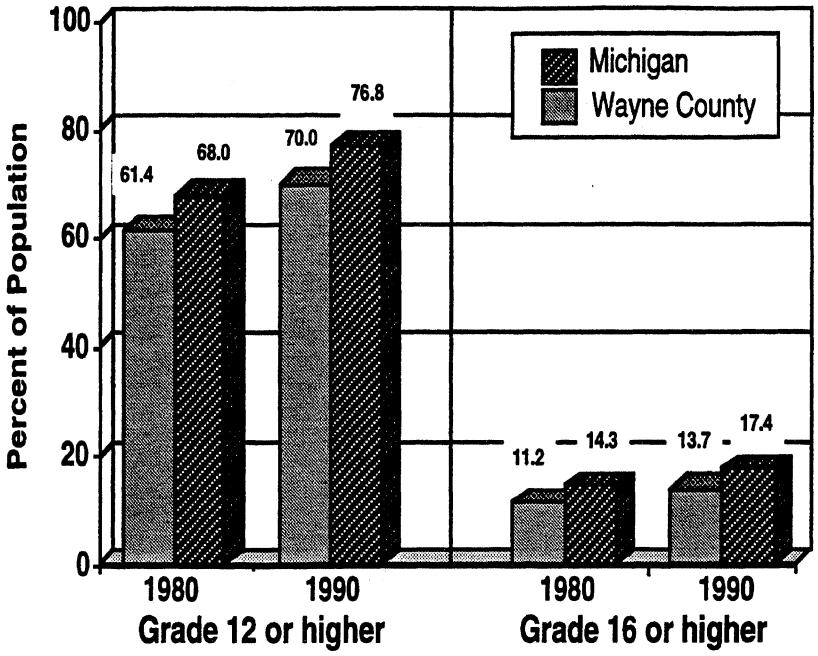
CHART I.7
SUPPLIER AVERAGE ANNUAL WAGES (SIC 3714)
WAYNE COUNTY VS. MICHIGAN VS. UNITED STATES
1988 - 1993



In its recent study for the Michigan Jobs Commission, OSAT forecast U.S. and Michigan hiring by the Big Three for 1995-2003 based on company-generated attrition forecasts, matched against a special OSAT Big Three employment forecast for the period. Results from this study project an overall Michigan attrition rate of 42 percent for 1995-2003, and an 89 percent state replacement hiring rate. These trend rates as applied to Wayne County's current level of Big Three employment would forecast 38,991 quits or retirements during 1995-2003, and a need for 34,702 total replacement hires in the same period in the county. In other words, about 3,855 annual replacement hires will be needed in Wayne County if the region is to maintain its share of total Big Three employment. However, based on the qualitative discussions provided by the Big Three human-resource planning departments (also contained in the recent Jobs Commission study), Wayne County is hardly assured of this forecast level of hiring.

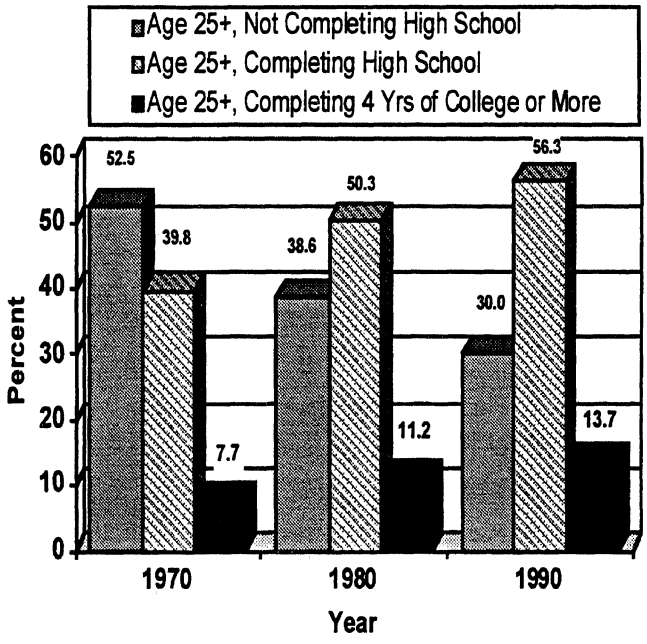
A major finding of the Jobs Commission study, *Driving America's Renaissance*, was that the quality of available labor will be a large determining factor in deciding any region's share of replacement hiring. To a large extent, labor quality is an output of the local educational system. Chart I.8, which compares basic rates of educational attainment for Michigan and Wayne County, indicates little improvement in the county's basic educational performance versus the overall state. On the other hand, Wayne County appears to be in a favorable position to improve these performance figures—especially in terms of labor available to an automotive industry that must hire soon and hire well. Chart I.9 illustrates an undeniable pattern of improvement in the educational accomplishments of Wayne County residents over time. As study-discussion results from sections II and III below will reveal, this pattern of improvement must be reinforced and maintained if the county is to receive its share and more of future automotive success.

CHART I.8
EDUCATION ATTAINMENT, PERCENTAGE OF TOTAL POPULATION
WAYNE VS. MICHIGAN



Source: Census data

CHART I.9
EDUCATION ATTAINMENT WAYNE COUNTY



Source: Woods & Poole Economics, Inc., 1994

B. Analysis of Wayne County's Economic Performance[2]

Wayne County's recent economic performance can be evaluated in two dimensions. First, the county can be compared with its peers: large urban counties that include the metropolitan area's central city. Second, its performance can be compared with other counties where motor-vehicle manufacturing is the major economic activity.

Wayne County's peers are defined as those large counties where the central city accounts for between one-third and two-thirds of the county's population. This excludes several counties with cities that are frequently compared to Detroit. For example, many people compare Detroit to Atlanta, but Fulton County, Georgia, had a population in 1990 of only 648,951, less than one-third of Wayne County's population. On the other hand, Dade County, Florida, had a population of 1,937,094, about the same as Wayne County, but it is excluded from the analysis because its central city (Miami) accounts for a relatively small proportion of the county's total population.

Wayne County and 19 peer counties are identified in table I.1.[3] The first four columns of data in table I.1 show the county's population in 1969, 1979, 1989 and 1993. The first three years were selected because they correspond to business cycle peaks in Wayne County; 1993 is included because it is the most recent year for which county income and earnings data are available. More recent data (1994) will be available in June 1996, and the tables could be updated to include 1994 data at that time. The last three columns of data show the percentage change in total population between the periods.

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[2] Donald R. Grimes, Senior Research Associate, Institute of Labor and Industrial Relations, University of Michigan.

[3] The following large counties (population over 950,000) were excluded from the list of peers because they did not include the metropolitan area's central city or the central city was too small or too large a proportion of the county's population: Orange, California; Kings, New York; Queens, New York; Dade, Florida; Philadelphia, Pennsylvania; New York, New York; San Bernadino, California; Middlesex, Massachusetts; Suffolk, New York; Nassau, New York; Broward, Florida; Bexar, Texas; and Riverside, California.

TABLE I.1
POPULATION IN WAYNE COUNTY AND ITS PEERS

	Population (In thousands)				Percent Change		
	1969	1979	1989	1993	69 - 79	79 - 89	89 - 93
Wayne, Michigan (Detroit)	2685.2	2353.2	2123.0	2078.8	-12.4	-9.8	-2.1
Rank (out of 20)	(3)	(3)	(5)	(6)	(20)	(20)	(20)
Maricopa, Arizona (Phoenix)	946.0	1456.9	2094.9	2268.8	54.0	43.8	8.3
Alameda, California (Oakland)	1060.1	1099.3	1263.7	1315.4	3.7	15.0	4.1
Los Angeles, California (Los Angeles)	6989.9	7401.0	8741.4	9741.4	5.9	18.1	11.4
Sacramento, California (Sacramento)	618.7	768.5	1017.8	1096.7	24.2	32.4	7.8
San Diego, California (San Diego)	1341.0	1827.6	2439.6	2611.9	36.3	33.5	7.1
Santa Clara, California (San Jose)	1033.4	1271.4	1480.4	1543.6	23.0	16.4	4.3
Cook, Illinois (Chicago)	5473.7	5287.2	5112.0	5141.1	-3.4	-3.3	0.6
Hennepin, Minnesota (Minneapolis)	967.8	931.8	1022.7	1045.7	-3.7	9.8	2.2
St. Louis, Missouri (St. Louis)	898.9	971.5	990.4	1002.0	8.1	1.9	1.2
Erie, New York (Buffalo)	1108.8	1033.1	972.8	970.6	-6.8	-5.8	-0.2
Cuyahoga, Ohio (Cleveland)	1707.6	1514.2	1418.0	1408.2	-11.3	-6.4	-0.7
Franklin, Ohio (Columbus)	815.6	877.4	952.0	999.6	7.6	8.5	5.0
Hamilton, Ohio (Cincinnati)	918.0	879.5	865.9	871.0	-4.2	-1.5	0.6
Allegheny, Pennsylvania (Pittsburgh)	1606.6	1454.3	1344.0	1329.1	-9.5	-7.6	-1.1
Dallas, Texas (Dallas)	1282.7	1522.1	1833.5	1927.0	18.7	20.5	5.1
Harris, Texas (Houston)	1709.4	2337.5	2795.6	3005.7	36.7	19.6	7.5
Tarrant, Texas (Fort Worth)	684.9	835.1	1149.5	1233.0	21.9	37.6	7.3
King, Washington (Seattle)	1142.5	1235.6	1466.9	1578.0	8.1	18.7	7.6
Milwaukee, Wisconsin (Milwaukee)	1056.2	972.1	955.5	946.8	-8.0	-1.7	-0.9

Source: U.S. Department of Commerce, Regional Economic Information System, Compiled by ILIR, University of Michigan

In 1969, Wayne County ranked third among its peers with a population of 2,685,200. By 1993 the county's population had declined to only 2,078,800. Several other peer counties also lost population during this period (Cook, Illinois; Cuyahoga, Ohio; Allegheny, Pennsylvania; and Milwaukee, Wisconsin), but none declined as much as Wayne. In fact, while the relative performance of its peers varied by decade, Wayne's performance was the worst in every period.

Per capita personal income for each of the peer counties is shown in table I.2. Per capita personal income is generally considered the broadest measure of an area's economic welfare. Personal income includes all wages and salaries, proprietor's income, dividends, interest, rent and transfer payments received by a county's residents. In 1969, Wayne County ranked 12th in per capita personal income, but by 1993 it was dead last, with per capita personal income of $19,912.

TABLE I.2
PERSONAL INCOME PER CAPITA AND ITS PEERS

	Per Capita Personal Income (In dollars)				Percent Change		
	1969	1979	1989	1993	69 - 79	79 - 89	89 - 93
Wayne, Michigan (Detroit)	4,217	9,782	17,104	19,912	132.0	74.8	16.4
Rank (out of 20)	(12)	(14)	(19)	(20)	(13)	(19)	(16)
Maricopa, Arizona (Phoenix)	3,723	9,287	17,542	20,196	149.4	88.9	15.1
Alameda, California (Oakland)	4,532	10,631	20,557	24,234	134.6	93.4	17.9
Los Angeles, California (Los Angeles)	4,748	10,736	19,659	20,309	126.1	83.1	3.3
Sacramento, California (Sacramento)	4,041	9,727	17,850	20,750	140.7	83.5	16.2
San Diego, California (San Diego)	4,192	9,472	18,979	20,950	126.0	100.4	10.4
Santa Clara, California (San Jose)	4,679	11,600	23,477	27,360	147.9	102.4	16.5
Cook, Illinois (Chicago)	4,748	10,686	20,131	23,983	125.1	88.4	19.1
Hennepin, Minnesota (Minneapolis)	4,665	11,598	23,454	28,265	148.6	102.2	20.5
St. Louis, Missouri (St. Louis)	5,007	11,218	23,704	28,186	124.0	111.3	18.9
Erie, New York (Buffalo)	3,983	8,922	16,975	20,344	124.0	90.3	19.8
Cuyahoga, Ohio (Cleveland)	4,633	10,577	19,855	23,632	128.3	87.7	19.0
Franklin, Ohio (Columbus)	3,929	8,991	18,204	21,547	128.9	102.5	18.4
Hamilton, Ohio (Cincinnati)	4,228	9,849	19,620	23,713	133.0	99.2	20.9
Allegheny, Pennsylvania (Pittsburgh)	4,094	10,107	19,723	24,406	146.9	95.1	23.7
Dallas, Texas (Dallas)	4,397	10,768	20,427	24,759	144.9	89.7	21.2
Harris, Texas (Houston)	4,007	11,231	18,539	22,991	180.3	65.1	24.0
Tarrant, Texas (Fort Worth)	3,974	9,696	17,491	21,500	144.0	80.4	22.9
King, Washington (Seattle)	4,782	11,719	23,183	28,203	145.1	97.8	21.7
Milwaukee, Wisconsin (Milwaukee)	4,220	9,964	17,663	21,339	136.1	77.3	20.8

Source: U.S. Department of Commerce, Regional Economic Information System, Compiled by ILIR, University of Michigan

Wayne County's performance was not as weak when measured by growth in per capita income. In terms of growth, it ranked between 13th and 19th during this period. The apparent contradiction between these two measures is explained by the fact that counties with per capita personal income below Wayne in 1969 tended to grow faster than Wayne, and that some counties with incomes greater than Wayne's in 1969 grew slightly slower than Wayne during some of the periods examined.

Perhaps most worrisome is that Wayne County performed worse than all of its "rust-belt" peers during the 1980s and 1990s. The difference in growth rates appears to have narrowed between 1989 and 1993, however, and the strong economic performance of the automobile industry in 1994 and 1995 has undoubtedly improved the county's relative position.

The large role that manufacturing plays in the county's economy is shown in table I.3. In 1969, total manufacturing earnings per capita was $1,596 in Wayne County, 38 percent of total personal income per capita in the county. By 1993, manufacturing earnings per capita accounted for only 23 percent of total personal income per capita in Wayne County. The decline in manufacturing's share of personal income per capita occurred in 19 of the 20 counties. The exception is Santa Clara, California, where the

dramatic growth of the computer industry caused the manufacturing sector to increase its share of personal income per capita from 29 percent to 34 percent.

TABLE I.3
EARNINGS PER CAPITA, MANUFACTURING, WAYNE COUNTY AND ITS PEERS

	Per Capita Manufacturing Earnings (In dollars)				Percent Change		
	1969	1979	1989	1993	69 - 79	79 - 89	89 - 93
Wayne, Michigan (Detroit)	1,596	3,857	4,609	4,658	141.6	19.5	1.1
Rank (out of 20)	(4)	(2)	(5)	(6)	(4)	(15)	(15)
Maricopa, Arizona (Phoenix)	711	1,365	2,235	2,378	91.9	63.7	6.4
Alameda, California (Oakland)	823	1,780	2,313	2,620	116.1	29.9	13.3
Los Angeles, California (Los Angeles)	1,250	2,396	3,513	2,838	91.7	46.6	-19.2
Sacramento, California (Sacramento)	332	530	955	1,044	59.6	80.3	9.3
San Diego, California (San Diego)	516	1,033	1,929	1,887	100.0	86.8	-2.2
Santa Clara, California (San Jose)	1,376	3,937	8,690	9,390	186.1	120.7	8.1
Cook, Illinois (Chicago)	1,409	2,674	3,328	3,610	89.7	24.5	8.5
Hennepin, Minnesota (Minneapolis)	1,085	2,646	4,484	4,834	143.8	69.5	7.8
St. Louis, Missouri (St. Louis)	1,095	2,359	4,910	4,680	115.4	108.1	-4.7
Erie, New York (Buffalo)	1,175	2,343	2,785	3,136	99.4	18.9	12.6
Cuyahoga, Ohio (Cleveland)	1,672	3,483	4,654	5,030	108.3	33.6	8.1
Franklin, Ohio (Columbus)	949	1,707	2,442	2,835	79.9	43.0	16.1
Hamilton, Ohio (Cincinnati)	1,610	3,531	5,081	5,636	119.3	43.9	10.9
Allegheny, Pennsylvania (Pittsburgh)	1,167	2,701	2,770	2,948	131.4	2.5	6.4
Dallas, Texas (Dallas)	1,092	2,201	3,747	3,893	101.5	70.3	3.9
Harris, Texas (Houston)	759	1,983	2,276	2,795	161.3	14.7	22.8
Tarrant, Texas (Fort Worth)	1,231	2,196	3,388	3,365	78.4	54.3	-0.7
King, Washington (Seattle)	1,209	2,509	4,404	4,454	107.6	75.5	1.1
Milwaukee, Wisconsin (Milwaukee)	1,606	3,551	4,031	4,325	121.1	13.5	7.3

Source: U.S. Department of Commerce, Regional Economic Information System, Compiled by ILIR, University of Michigan

Motor-vehicle manufacturing earnings per capita are shown in table I.4. The dominant role this industry plays in Wayne's economy is indicated by the fact, that in 1993, it generated $3,148 for every man, woman and child in the county. The motor-vehicle industry is far less important in all of the other counties. Even in St. Louis, which has the most motor-vehicle manufacturing of the peer counties, per capita earnings in this industry is only one-fifth the size of Wayne County's. Moreover, it appears that motor-vehicle manufacturing grew at about the same rate in Wayne as in the other counties. The motor-vehicle industry does not appear to be the cause of Wayne's relatively poor performance during the past 24 years.

TABLE I.4
EARNINGS PER CAPITA, MOTOR-VEHICLE MANUFACTURING, WAYNE COUNTY AND ITS PEERS

	Per Capita Motor-Vehicle Earnings (In dollars)				Percent Change		
	1969	1979	1989	1993	69 - 79	79 - 89	89 - 93
Wayne, Michigan (Detroit)	840	2,296	3,098	3,148	173.5	34.9	1.6
Rank (out of 20)	(1)	(1)	(1)	(1)	(6)	(7 of 18)	(12 of 17)
Maricopa, Arizona (Phoenix)	5	15	14	52	204.0	-9.6	282.0
Alameda, California (Oakland)	98	219	158	263	123.3	-27.7	65.9
Los Angeles, California (Los Angeles)	32	74	62	54	129.7	-16.5	-12.5
Sacramento, California (Sacramento)	2	8	8	9	336.1	-0.2	22.4
San Diego, California (San Diego)	1	4	8	9	230.1	125.7	2.6
Santa Clara, California (San Jose)	49	90	4	5	84.9	-96.1	53.0
Cook, Illinois (Chicago)	20	52	78	85	155.5	49.3	9.4
Hennepin, Minnesota (Minneapolis)	12	21	(D)	36	75.0	NA	NA
St. Louis, Missouri (St. Louis)	163	320	586	(D)	96.3	83.0	NA
Erie, New York (Buffalo)	140	389	421	478	178.3	8.1	13.6
Cuyahoga, Ohio (Cleveland)	198	470	460	421	137.8	-2.2	-8.4
Franklin, Ohio (Columbus)	39	46	70	90	17.4	52.5	29.6
Hamilton, Ohio (Cincinnati)	148	385	(D)	(D)	159.9	NA	NA
Allegheny, Pennsylvania (Pittsburgh)	6	19	8	8	209.7	-59.0	1.7
Dallas, Texas (Dallas)	26	25	28	39	-0.3	9.8	37.8
Harris, Texas (Houston)	5	7	10	10	37.6	45.0	-0.9
Tarrant, Texas (Fort Worth)	75	174	187	180	132.2	7.7	-3.9
King, Washington (Seattle)	13	34	100	101	166.4	193.8	1.4
Milwaukee, Wisconsin (Milwaukee)	109	251	261	274	129.7	4.1	4.8

Source: U.S. Department of Commerce, Regional Economic Information System, Compiled by ILIR, University of Michigan

The weak performance of non-motor-vehicle manufacturing during the 1980s and 1990s is part of the explanation for Wayne's poor showing. Between 1969 and 1979, earnings per capita in non-motor-vehicle manufacturing increased by 106.3 percent, ranking 10th among the 20th counties (see table I.5). During the 1980s, however, the performance of this sector in Wayne County was very poor. Between 1979 and 1989, per capita earnings declined by 3.2 percent (in nominal dollars, i.e., not adjusted for inflation). Only Allegheny, Pennsylvania (growth of 3.0 percent), was close to Wayne's performance, and it had to absorb the loss of thousands of steel industry jobs.

TABLE I.5
EARNINGS PER CAPITA, NON-MOTOR-VEHICLE MANUFACTURING, WAYNE COUNTY AND ITS PEERS

	Per Capita Nonmotor-Vehicle Manufacturing Earnings (In dollars)				Percent Change		
	1969	1979	1989	1993	69 - 79	79 - 89	89 - 93
Wayne, Michigan (Detroit)	757	1,561	1,511	1,509	106.3	-3.2	-0.0
Rank (out of 20)	(15)	(16)	(17 of 18)	(17 of 18)	(10)	(18 of 18)	(14 of 17
Maricopa, Arizona (Phoenix)	707	1,350	2,222	2,326	91.1	64.5	4.7
Alameda, California (Oakland)	725	1,560	2,154	2,357	115.2	38.0	9.4
Los Angeles, California (Los Angeles)	1,217	2,322	3,451	2,784	90.7	48.6	-19.3
Sacramento, California (Sacramento)	330	522	948	1,035	58.2	81.5	9.2
San Diego, California (San Diego)	515	1,029	1,920	1,878	99.7	86.6	-2.2
Santa Clara, California (San Jose)	1,327	3,847	8,687	9,385	189.8	125.8	8.0
Cook, Illinois (Chicago)	1,389	2,622	3,250	3,526	88.7	24.0	8.5
Hennepin, Minnesota (Minneapolis)	1,073	2,625	(D)	4,798	144.6	NA	NA
St. Louis, Missouri (St. Louis)	932	2,039	4,324	(D)	118.8	112.1	NA
Erie, New York (Buffalo)	1,035	1,954	2,364	2,657	88.7	21.0	12.4
Cuyahoga, Ohio (Cleveland)	1,475	3,013	4,195	4,609	104.3	39.2	9.9
Franklin, Ohio (Columbus)	910	1,662	2,372	2,745	82.6	42.8	15.7
Hamilton, Ohio (Cincinnati)	1,462	3,146	(D)	(D)	115.2	NA	NA
Allegheny, Pennsylvania (Pittsburgh)	1,161	2,682	2,762	2,940	130.9	3.0	6.4
Dallas, Texas (Dallas)	1,067	2,175	3,719	3,855	103.9	71.0	3.7
Harris, Texas (Houston)	754	1,977	2,266	2,785	162.1	14.6	23.0
Tarrant, Texas (Fort Worth)	1,156	2,022	3,201	3,185	74.9	58.3	-0.5
King, Washington (Seattle)	1,196	2,475	4,304	4,353	106.9	73.9	1.1
Milwaukee, Wisconsin (Milwaukee)	1,497	3,300	3,770	4,052	120.5	14.2	7.5

Note that the (D) indicates that the government does not publish information on this county and period. Source: U.S. Department of Commerce, Regional Economic Information System, compiled by ILIR, University of Michigan.

During the 1990s, Wayne County's relative position improved (a growth ranking of 14 out of 17), but this was the result of the loss of defense-related manufacturing jobs in Los Angeles, San Diego and Tarrant, Texas. Compared with other rust-belt counties, Wayne's performance was very poor.

The relatively poor performance of the finance industry (shown in table I.6) and the business and professional service industries (shown in table I.7) is the major cause of Wayne's weakness during the 1970s. Per capita earnings in these industries increased in Wayne during this period, but at a much slower rate than in the other counties. The county's relative performance in these industries improved during the 1980s and 1990s, but by 1993, Wayne ranked 16th in per capita earnings in finance, and 20th in per capita earnings in business and professional services.

TABLE I.6
EARNINGS PER CAPITA, FINANCE, INSURANCE AND REAL ESTATE, WAYNE COUNTY AND ITS PEERS

	Per Capita Finance, Insurance & Real Estate Earnings (In dollars)				Percent Change		
	1969	1979	1989	1993	69 - 79	79 - 89	89 - 93
Wayne, Michigan (Detroit)	214	419	837	974	95.6	99.8	16.3
Rank (out of 20)	(11)	(13)	(14)	(16)	(20)	(13)	(19)
Maricopa, Arizona (Phoenix)	199	531	1,050	1,355	167.0	97.7	29.1
Alameda, California (Oakland)	166	415	676	890	150.2	63.0	31.7
Los Angeles, California (Los Angeles)	248	620	1,200	1,305	150.4	93.4	8.7
Sacramento, California (Sacramento)	137	394	820	1,261	187.9	108.2	53.8
San Diego, California (San Diego)	141	374	726	943	165.2	94.0	29.9
Santa Clara, California (San Jose)	133	387	655	808	192.0	69.4	23.2
Cook, Illinois (Chicago)	295	833	1,895	2,371	182.5	127.5	25.1
Hennepin, Minnesota (Minneapolis)	312	889	2,217	3,378	185.3	149.5	52.3
St. Louis, Missouri (St. Louis)	178	375	1,322	1,691	110.1	252.8	27.9
Erie, New York (Buffalo)	141	308	796	1,094	118.7	158.5	37.4
Cuyahoga, Ohio (Cleveland)	221	532	1,146	1,581	140.7	115.4	38.0
Franklin, Ohio (Columbus)	243	622	1,708	2,184	156.4	174.4	27.9
Hamilton, Ohio (Cincinnati)	232	536	1,293	1,687	131.3	141.4	30.4
Allegheny, Pennsylvania (Pittsburgh)	186	464	1,145	1,628	149.3	146.6	42.2
Dallas, Texas (Dallas)	350	961	2,027	2,694	174.5	110.9	32.9
Harris, Texas (Houston)	227	658	1,062	1,427	189.2	61.4	34.4
Tarrant, Texas (Fort Worth)	156	385	574	767	146.4	48.9	33.6
King, Washington (Seattle)	282	749	1,502	1,907	165.5	100.6	27.0
Milwaukee, Wisconsin (Milwaukee)	223	591	1,371	1,696	164.9	131.9	23.8

Source: U.S. Department of Commerce, Regional Economic Information System, compiled by ILIR, University of Michigan.

TABLE I.7
EARNINGS PER CAPITA IN BUSINESS AND PROFESSIONAL SERVICES, WAYNE COUNTY AND ITS PEERS

	Per Capita Business & Professional Services Earnings (In dollars)				Percent Change		
	1969	1979	1989	1993	69 - 79	79 - 89	89 - 93
Wayne, Michigan (Detroit)	139	308	771	941	121.8	150.1	22.1
Rank (out of 20)	(11)	(19)	(20)	(20)	(20)	(19)	(18)
Maricopa, Arizona (Phoenix)	120	375	1,107	1,399	213.6	195.2	26.4
Alameda, California (Oakland)	127	427	1,543	2,134	236.7	261.1	38.3
Los Angeles, California (Los Angeles)	217	646	1,757	1,787	197.7	172.1	1.7
Sacramento, California (Sacramento)	78	335	1,054	1,335	327.7	214.3	26.7
San Diego, California (San Diego)	108	403	1,318	1,685	274.3	226.8	27.8
Santa Clara, California (San Jose)	245	919	2,774	3,919	274.5	201.9	41.3
Cook, Illinois (Chicago)	206	596	1,694	2,096	189.1	184.3	23.8
Hennepin, Minnesota (Minneapolis)	181	676	2,268	2,917	273.2	235.4	28.6
St. Louis, Missouri (St. Louis)	91	387	1,466	1,847	327.5	278.7	26.0
Erie, New York (Buffalo)	42	288	785	961	581.5	172.9	22.4
Cuyahoga, Ohio (Cleveland)	167	512	1,463	1,734	205.9	185.7	18.6
Franklin, Ohio (Columbus)	137	528	1,438	1,888	285.7	172.3	31.3
Hamilton, Ohio (Cincinnati)	145	479	1,362	1,788	231.5	184.1	31.2
Allegheny, Pennsylvania (Pittsburgh)	179	471	1,545	1,987	163.5	227.9	28.6
Dallas, Texas (Dallas)	200	748	2,439	3,290	274.8	226.1	34.9
Harris, Texas (Houston)	194	854	1,846	2,466	340.5	116.2	33.6
Tarrant, Texas (Fort Worth)	95	313	785	1,268	230.4	150.4	61.7
King, Washington (Seattle)	140	623	2,259	3,227	345.9	262.5	42.9
Milwaukee, Wisconsin (Milwaukee)	114	376	1,076	1,335	228.5	186.3	24.0

Source: U.S. Department of Commerce, Regional Economic Information System, compiled by ILIR, University of Michigan.

Wayne County's economic future depends upon either achieving growth in non-motor-vehicle manufacturing, finance, and business and professional services at a rate comparable to its peer counties, or by increasing its share of motor-vehicle manufacturing. Wayne County's recent performance in motor-vehicle manufacturing compared with other counties that have a large motor-vehicle manufacturing industry has not been encouraging.

The 25 counties with the most earnings from motor-vehicle manufacturing in 1993 are shown in table I.8. Wayne County, with $6.5 billion in earnings, is far above any other county. Note that the six counties with the greatest earnings in motor-vehicle manufacturing are located in southeastern Michigan. The major change in the ranking of the top six counties since 1969 is that Cuyahoga, Ohio, fell from fifth to eleventh and Ingham and Washtenaw have moved up.

TABLE I.8
25 COUNTIES WITH THE GREATEST EARNINGS FROM MOTOR-VEHICLE MANUFACTURING

	Earnings, Millions of Dollars				Percentage Change			
County	1969	1979	1989	1993	1969-79	1979-89	1989-93	1969-93
Wayne, Michigan	2,254.6	5,403.1	6,577.8	6,544.9	140	22	-0	190
Oakland, Michigan	522.8	1,393.6	2,002.9	2,819.5	167	44	41	439
Macomb, Michigan	521.2	880.0	2,035.7	2,565.5	69	131	26	392
Genesee, Michigan	796.0	2,056.9	1,964.4	2,021.5	158	-4	3	154
Ingham, Michigan	335.4	771.3	(D)	922.3	130	NA	NA	175
Washtenaw, Michigan	194.8	701.2	825.4	855.8	260	18	4	339
Marion, Indiana	200.1	450.6	413.1	722.3	125	-8	75	261
Saginaw, Michigan	141.2	356.0	(D)	711.1	152	NA	NA	404
Montgomery, Ohio	(D)	(D)	619.7	684.3	NA	NA	10	NA
Lucas, Ohio	153.5	355.1	619.6	630.2	131	74	2	311
Cuyahoga, Ohio	337.7	712.1	652.0	592.9	111	-8	-9	76
Trumbull, Ohio	91.1	260.4	(D)	553.1	186	NA	NA	507
Maury, Tennessee	0.0	0.0	(D)	530.4	0	NA	NA	Infinite
Los Angeles, California	226.6	551.1	543.6	530.4	143	-1	-2	134
Lorain, Ohio	131.9	338.1	(D)	492.5	156	NA	NA	273
Erie, New York	144.2	402.4	409.6	464.2	179	2	13	222
Jefferson, Kentucky	70.0	225.2	(D)	461.0	222	NA	NA	559
Cook, Illinois	111.4	274.9	396.7	436.5	147	44	10	292
New Castle, Delaware	101.0	233.1	(D)	433.5	131	NA	NA	329
Monroe, New York	40.7	0.4	(D)	420.7	-99	NA	NA	934
Allen, Indiana	126.6	360.6	370.8	409.0	185	3	10	223
Union, Ohio	3.5	16.4	(D)	405.6	369	NA	NA	11489
Niagara, New York	82.1	252.2	(D)	393.3	207	NA	NA	379
St. Louis, Missouri	146.6	311.0	580.1	(D)	112	87	NA	NA
Hamilton, Ohio	135.9	338.3	(D)	(D)	149	NA	NA	NA

Note that the (D) indicates that the government does not publish information on this county and period. Source: U.S. Department of Commerce, Regional Economic Information System, compiled by ILIR, University of Michigan.

The lack of information for some counties makes it difficult to compare growth rates in the sub-periods, but in general, Wayne County was at or below average. Over the entire period from 1969 to 1993, motor-vehicle manufacturing earnings in Wayne County increased 190 percent, exceeding Genesee, Ingham, Cuyahoga, and Los Angeles counties,[4] but falling short of the growth in the other 20 counties. Many of the counties with the most rapid growth in motor-vehicle manufacturing (Maury, Tennessee; Union, Ohio; Monroe, New York; Jefferson, Kentucky; and Trumbull, Ohio) had relatively little motor-vehicle manufacturing activity in 1969.

Table I.9 shows the 50 counties with the highest per capita earnings in motor-vehicle manufacturing in 1993. The three counties with the most motor-vehicle manufacturing activity relative to their populations in 1993 (Union, Ohio; Scott, Kentucky; and Maury,

[4]Among the counties that had a large motor vehicle manufacturing industry in 1969 but did not make the top 25 in 1993, Wayne outperformed Milwaukee, Wisconsin; St. Louis City, Missouri; Fulton, Georgia; and Kenosha, Wisconsin.

Tennessee) had virtually no motor-vehicle manufacturing in 1969. Other counties that have become major centers of motor-vehicle manufacturing over the past 24 years include Howard, Indiana; Limestone, Alabama; Freemont, Iowa; Peach, Georgia; Shelby, Ohio; Logan, Ohio; and White, Indiana.[5] Although many of these counties are located in southern states, their most obvious common feature is that they all have relatively small populations.

TABLE I.9
50 COUNTIES WITH THE GREATEST PER CAPITA EARNINGS IN MOTOR-VEHICLE MANUFACTURING

	Per Capita Earnings, Dollars				Population
County	1969	1979	1989	1993	1993
Union, Ohio	150	558	(D)	11,758	34,500
Scott, Kentucky	0	0	(D)	11,680	25,900
Maury, Tennessee	0	0	(D)	8,638	61,400
Winnebago, Iowa	(D)	(D)	(D)	6,648	11,900
Edwards, Illinois	(D)	(D)	(D)	6,643	7,300
Genesee, Michigan	1,784	4,560	4,562	4,674	432,500
Howard, Indiana	545	1,454	(D)	4,318	82,200
Boone, Illinois	2,069	4,644	(D)	4,298	33,700
Macomb, Michigan	840	1,276	2,857	3,524	728,100
Limestone, Alabama	7	1,065	(D)	3,409	57,600
Saginaw, Michigan	644	1,570	(D)	3,348	212,400
Ingham, Michigan	1,298	2,862	(D)	3,296	279,800
Fremont, Iowa	0	0	(D)	3,258	8,200
Wayne, Michigan	840	2,296	3,098	3,148	2,078,800
Washtenaw, Michigan	871	2,667	2,941	2,961	289,000
Peach, Georgia	380	1,351	(D)	2,750	22,300
Shelby, Ohio	0	0	(D)	2,669	46,300
Logan, Ohio	121	373	(D)	2,598	44,400
White, Indiana	57	448	(D)	2,558	24,100
Rock, Wisconsin	570	1,571	(D)	2,531	144,300
Oakland, Michigan	591	1,381	1,868	2,496	1,129,600
Rutherford, Tennessee	13	18	(D)	2,441	134,800
Trumbull, Ohio	395	1,079	(D)	2,410	229,500
Clark, Ohio	474	896	(D)	2,383	147,700
Elkhart, Indiana	53	315	1,843	2,306	161,600

Note that the (D) indicates that the government does not publish information on this county and period. Source: U.S. Department of Commerce, Regional Economic Information System, compiled by ILIR, University of Michigan.

[5]Winnebago, Iowa, and Edwards, Illinois, would probably also make this list if the 1969 earnings data were available.

Table I.9 cont'd)

TABLE I.9
50 COUNTIES WITH THE GREATEST PER CAPITA EARNINGS IN MOTOR-VEHICLE MANUFACTURING

	Per Capita Earnings, Dollars				Population
County	1969	1979	1989	1993	1993
Steuben, Indiana	252	647	1,959	2,166	28,800
Allen, Ohio	541	1,739	1,695	2,030	109,600
Yalobusha, Mississippi	0	0	(D)	2,016	12,100
Clay, Indiana	0	352	(D)	1,960	25,700
Pulaski, Virginia	0	572	(D)	1,907	34,500
Monroe, Michigan	308	642	1,562	1,876	136,100
Carroll, Kentucky	0	361	(D)	1,865	9,500
Dekalb, Tennessee	0	0	(D)	1,826	14,700
Henry, Indiana	597	1,048	(D)	1,815	48,700
Fairfield, South Carolina	0	0	(D)	1,797	22,400
Niagara, New York	349	1,094	(D)	1,773	221,800
Lorain, Ohio	519	1,238	(D)	1,772	278,200
Hillsdale, Michigan	215	659	1,023	1,737	44,300
Marshall, South Dakota	0	0	(D)	1,712	4,800
Clay, Missouri	537	1,007	(D)	1,669	161,000
Seward, Nebraska	0	345	(D)	1,657	15,900
Jasper, Illinois	0	0	0	1,654	10,600
Wright, Iowa	(D)	(D)	(D)	1,598	14,200
Noble, Ohio	207	823	(D)	1,595	11,800
Bedford, Tennessee	96	412	1,344	1,579	32,200
McLean, Illinois	15	28	(D)	1,558	135,900
Delaware, Indiana	530	1,152	(D)	1,529	119,400
Hart, Georgia	428	515	(D)	1,527	20,400
Adams, Indiana	0	178	1,317	1,461	31,700
Lucas, Ohio	320	753	1,341	1,374	458,700

Note that the (D) indicates that the government does not publish information on this county and period. Source: U.S. Department of Commerce, Regional Economic Information System, compiled by ILIR, University of Michigan.

The most rapidly growing centers of motor-vehicle manufacturing activity are not urban counties in Southern states, but small, typically rural counties in some Southern and Midwestern states. If Wayne County is going to maintain or increase its share of motor-vehicle manufacturing, it must become competitive with these small rural counties, including smaller counties in Michigan like Monroe, Hillsdale and St. Joseph.

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II. Emerging Automotive Trends and Wayne County

Wayne County Automotive Endowment

The information presented in this report was gathered using existing directories, industry journals, and Big Three governmental relations departments. Initial information for the part and component supplier section was gathered from the *ELM Guide to U.S. Automotive Sourcing Fourth Edition,*[6] and then cross referenced with other directories to ensure accuracy. The tool and die facilities were located using the *1995 Michigan Industrial Directory.*[7] Engineering service firms, and research and development facilities were located through various industry periodicals and trade journals. The information for Big Three facilities was gathered from company governmental relations department.

The Office for the Study of Automotive Transportation (OSAT) divided Wayne county's automotive endowment into 17 automotive categories. These include 12 vehicle component systems, one parts category not elsewhere classified, vehicle assembly, tool and die production, engineering and research and development firms, and Big Three non-manufacturing operations.

Our coding of automotive facilities does not correlate directly to traditional measures such as the standard industrial classification (SIC). Although this may present occasional difficulties in comparing information from other resources, we believe the coding method chosen is a more appropriate representation of Wayne county's automotive endowment. Second, Ford Motor Company corporate policy does not permit the release of employment count for individual facilities. Therefore, any Ford facility employment counts contained in this directory must be viewed as unofficial. However, we do believe that the employment numbers for the manufacturing facilities represent useful estimates of actual employment. Conversely, employment by facility for engineering and administration may be somewhat unreliable. Finally, engineering service firms proved to be extremely difficult to define and locate. Therefore we suspect

[6] *The Elm Guide to U.S. Automotive Sourcing, Volume I & II, U.S. Manufacturing Operations*, Fourth Edition, Elm International, Inc., E. Lansing, MI

[7] *1995 Michigan Industrial Directory,* Harris Publishing Co., Twinsburg, OH

the actual number of such facilities to be somewhat higher than represented. Table III.1 provides a count of all automotive facilities in Wayne county facilities and their employment by category.

TABLE II.1
1996 AUTOMOTIVE FACILITIES AND EMPLOYMENT IN WAYNE COUNTY

Category Description	Facilities in Directory	Employment
Engine Assembly	6	12,261
Engine Parts	17	2,494
Transmission Assembly	2	9,224
Transmission Parts	6	686
Engine/Emission Control	3	234
Body	13	5,792
Comfort/Convenience	13	3,250
Suspension/Steering	11	7,945
Glass	4	1,924
Hardware	1	215
Interior Hard/Soft Trim	20	5,409
Brakes/Wheels/Tires	3	630
Other Parts	23	1,640
Other, not elsewhere	7	936
Vehicle Assembly	8	21,903
Tool & Die, Prototyping, and Special Tooling	222	6,730
Engineering Services and R & D	36	3,270
Vehicle Producer HQ's, Engineering and Tool & Die	16	36,947
Total	441	121,490

Big Three Facilities

Although Wayne county has experienced a large number of Big Three facility shutdowns in the past 20 years, the county still contains a significant collection of core Big Three facilities. Within Wayne County eight assembly plants, five engine plants, and two transmission assembly facilities. These facilities combined account for nearly 40,000 jobs. Table III.2 provides a count of all Big Three facilities in Wayne county and employment by category.

TABLE II.2
1996 BIG THREE FACILITIES AND EMPLOYMENT IN WAYNE COUNTY

Category Description	Facilities in Directory	Employment
Engine Assembly	5	8,761
Engine Parts	2	223
Transmission Assembly	2	9,224
Transmission Parts	0	0
Engine/Emission Control	0	0
Body	2	3,982
Comfort/Convenience	1	1,938
Suspension/Steering	3	3,648
Glass	3	1,870
Hardware	0	0
Interior Hard/Soft Trim	1	1,483
Brakes/Wheels/Tires	0	0
Other Parts	6	722
Other, not elsewhere	0	0
Vehicle Assembly	8	21,903
Tool & Die, Prototyping, and Special Tooling	2	649
Engineering Services and R & D	12	2,243
Vehicle Producer HQ's, Engineering and Tool & Die	16	36,947
Total	63	93,593

The county also has 17 non-powertrain Big Three component facilities. This is a substantially lower number of such facilities than the county had 20 years ago. The low number of Big Three facilities relative to historical levels, combined with the varied product portfolio suggests some difficulty in developing a strategic plan for job growth. It is interesting to note that this count includes at least one facility that has recently been announced as for sale (Livonia Delphi Chassis).

Although Chrysler has recently reduced management and engineering employment in Wayne County, the county still accounts for nearly 41 percent of Michigan's, and 29 percent of total U.S. Big Three white collar employment. This large concentration of employment is attributed primarily to Ford. The Ford Motor Company continues to maintain the bulk of its North American administration and engineering staff in Wayne County. General Motors recent purchase of the Renaissance Center, and subsequent announcements regarding plans for the complex confirm that GM may increase its white collar employment in Wayne County.

Independent Automotive Facilities

Wayne County has a diverse endowment of independent automotive facilities. The county is especially well endowed with regard to powertrain, interiors components, and tool and die facilities.

TABLE II.3
1996 INDEPENDENT AUTOMOTIVE FACILITIES AND EMPLOYMENT IN WAYNE COUNTY

Category Description	Facilities in Directory	Employment
Engine Assembly	1	3,500
Engine Parts	15	2,271
Transmission Assembly	0	0
Transmission Parts	6	686
Engine/Emission Control	3	234
Body	11	1,810
Comfort/Convenience	12	1,312
Suspension/Steering	8	4,297
Glass	1	54
Hardware	1	215
Interior Hard/Soft Trim	19	3,926
Brakes/Wheels/Tires	3	630
Other Parts	17	918
Other, not elsewhere	7	4
Vehicle Assembly	0	936
Tool & Die, Prototyping, and Special Tooling	220	6,081
Engineering Services and R & D	24	1,027
Total	348	27,897

Independent Part and Component Supplier Facilities.

There are 104 independent part supplier facilities in Wayne county. This count does not include supplier headquarters, which were not identified for this study. Therefore, the employment figures represent a proxy for manufacturing employment at supplier facilities in Wayne County. Approximately 29 percent (33 percent by employment) of the part and component facilities are interior/comfort convenience related and 26 percent (42 percent by employment) are powertrain related. Included in the powertrain count is one independent diesel engine supplier (Detroit Diesel, 3,500 employees)—which represents about one half of the county's independent powertrain employment. Conversely, the county has lower than expected representation in brakes/wheels.

Tool and Die, Prototyping and Special Tooling Facilities

The county has 220 tool and die, prototyping, and special tools facilities. These facilities range in size from small family owned and operated operations employing fewer than five people to large full service tool and die suppliers with several hundred employees. These facilities, although in the same category, are indeed as different as their varied sizes and capabilities. They also face significant challenges in the coming decade. The progress shown in virtual prototype engineering and development may lead many of these companies to face significant changes. Because of the threat of

reduced reliance by the Big Three on prototypes and tooling for prototypes, this segment of the industry must be closely monitored.

Engineering Service Companies, and Research and Development Operations

Engineering service firms are difficult to locate and identify. There is limited information on the depth and breadth of this sector. The Big Three have strongly committed to reducing engineering staffing levels, and are increasingly relying on contract and service firm employment as a buffer. It is strongly suggested that Wayne County Economic Development Board contact the Michigan Employment Security Commission (MESC) for assistance in better defining the characteristics, and location of engineering service firms. There is a still evolving relationship between manufacturers, supplier, and engineering service firms, therefore, this relationship must be closely watched.

The future of supplier research and development centers appears less volatile than engineering service firms, yet still must be closely watched. In recent years, Wayne county has experienced significant attrition of its Big Three research and development. However, as the Big Three shift more development responsibilities to their suppliers, there may be a window of opportunity for Wayne county to gain back these jobs.

Facility Competitiveness

In our 1993 study[8] of Michigan's auto industry, we noted:

> Many industry observors assume that automotive firms use some standard, internal formula for ranking or picking plants for investment, disinvestment, or closure. However, this does not appear to be the case. Plant investment decisions are not mechanical by any means. Evaluations of the various factors considered in such decisions are quite complex, and the factors considered can change dramatically over time. In a complex industry like the auto industry, the list of criteria differs widely across types of plants, products, operations, and among individual companies. The actual reality is that each plant selection process is nearly unique. Criteria important in one type of operation at one time may dominate a certain decision in one firm, yet play a small role a few years later in a decision regarding other operations.
>
> For example, a decision on gray iron foundry capacity may require access to abundant water, low expected utility rates, and minimal investment discounted over a 20-year time horizon. Two competing plants might actually be equivalent on these key "make-or-break" factors, but the decision may then finally be made on initially less critical factors, such as

[8]Sean P. McAlinden and David J. Andrea, *Michigan: Still the Automotive State?* Office for the Study of Automotive Transportation, Transportation Research Institute, The University of Michigan-Ann Arbor, UMTRI-92-42.

marginal freight costs, relative labor settlement costs, or even access to subsidized training. There is, of course, no reason to expect that any of these same factors would play a role in a decision concerning final assembly plants or plants that specialize in stamping small parts. In fact, it is sometimes possible for a plant to show a relative disadvantage in one important area, but compensating advantages in every other criteria--so it is selected. It appears that location planning for facilities is not carried out through a series of sequential, discrete go/no go decision. Rather, the decision process appears better characterized as summing up of "expected" or forecasted values for certain important parameters over time.

Many criteria are not directly, or even indirectly influenced by state, county, or local policy. Yet it is essential for economic developers to be aware of all elements that affect facility competitiveness. Specifically, government policy cannot affect the product, or market trends. Yet well directed local government strategy may effectively compensate for what it cannot control. Properly structured tax incentives, training and education assistance programs, and other incentives may increase the likelihood of retaining existing facilities or gaining new investment. It is important for county economic developers to not only be aware of their current policies, but to attempt to decipher trends in targeted industries and to correlate them to policy initiatives.

Comparison of Wayne County's Endowment and The Delphi VIII Forecast and Analysis of the North American Automotive Industry

Knowledge of industry trends is an essential element of any proactive economic development strategy. Table II.4 presents a summary of critical automotive categories, and a brief description of trends that may affect each major Wayne County automotive sector in the coming decade. The remainder of this section will expand on these trends, and begin to assist in developing policies that will better position Wayne County for future automotive investment.

TABLE II.4
A COMPARISON OF WAYNE COUNTY'S CURRENT ENDOWMENT AND THE TRENDS FORECAST IN DELPHI VIII (SELECTED SECTORS)

Category	Big Three Employees	Supplier Employees	Outlook
Vehicle Body (stampings)	3,982	1,810	(+) Steel will remain dominant, contiguous stamping (–) New materials, Japanese still world class
Engine Parts	223	2,271	(+) New materials for engine parts, more valves per cylinder (–) Does not require proximity, new materials
Engine Emission Controls	N/A	0	(+) Increased sophistication of emissions systems LEV, ULEV, ZEV
Interior Trim	1,483	3,926	(+/-) Consolidation/rationalization of sector
Suspension/ Steering	3,648	4,297	(+) American Axle management, light trucks
Tool & Die Prototying and Special Tools	N/A	6,081	(+) These skills may be vital to the conversion—instead of an industrial park, think park? (–) Rapidly changing technology, small shops with rapidly changing technology
Engineering Service Firms	N/A	1,810	(+) Outsourcing of non-core skills (–) Virtual prototype engineering (–) Rationalization of components and platforms
Independent Research and Development	N/A	1,810	(+) Outsourcing of development to suppliers (–) Rationalization of supply base

The Office For the Study of Automotive Transportation's (OSAT) Delphi VIII is a detailed analysis of forecasts by three separate panels of automotive industry executives, directors, managers and engineers who are expert in automotive technology, materials, or marketing[9]. These individuals were selected because they occupy positions of responsibility within the automotive industry, and have strategic insight into important industry trends. The Delphi VIII is the eighth in a series of in-depth studies of long range automotive trends, which began with Delphi I in 1979. The forecast is composed of three volumes, Marketing, Technology, and Materials, and has individual panels for each volume.

This section will use the Delphi VIII forecast, supplemented with another OSAT publication, the *Vehicle, Engine and Transmission Timing Charts*, to assist Wayne County in developing an awareness of industry trends. It will also begin to develop a strategy to allow the county to proactively respond to these trends.

[9] David E. Cole, et al., *Delphi VIII, Forecast and Analysis of the North American Automotive Industry.* 3 Vols. Office for the Study of Automotive Transportation, Transportation Research Institute, The University of Michigan-Ann Arbor, UMTRI-96-01.

International Competition

No longer does Wayne County compete only with other counties or states for new automotive investment. The automotive industry is truly global. Decisions on investment location may include sites in other parts of North America, and even other parts of the world. Therefore, it is essential that the County keep abreast of Big Three sourcing strategies.

The marketing panel rated the perceived risk in terms of U.S. component and subsystem production loss due to the North America Free Trade Agreement (table II.5). Panelists rated vehicle assembly, engine and transmission, and body/chassis no worse than moderately at risk for increased Mexican sourcing. Such a rating is encouraging, given the number of such facilities in Wayne County.

TABLE II.5
MARKETING-36

How will NAFTA affect vehicle production and parts sourcing? Please indicate the perceived risk in terms of U.S. production loss that sourcing may be changed from the United States to Mexico.	
Scale: 1 = high risk 3 = moderate risk5 = low risk	
Vehicle System	**Mean Rating**
Electrical	2.3
Interior trim	2.3
Electronics	2.6
Brakes	2.9
Steering/suspension	3.0
Vehicle assembly	3.0
Engine	3.2
Transmission	3.5
Body/chassis	3.5

Several panelists commented on the complexity of engine and transmissions, and the concern for reliability being factors that may increase the likelihood that assembly of these products would stay in the United States. Another panelist added that the high investment cost for these facilities acts as a deterrent to Mexican sourcing strategy. However, there are currently several engine, transmission, and assembly plants already located in Mexico, which have achieved varying degrees of success.

Interior trim, a large employment sector in Wayne County, was rated as a high risk for increased Mexican sourcing. The automotive industry is undergoing a major restructuring, with significant manufacturing capability rationalization. At least two of the strongest competitors, Lear Corporation and Johnson Controls, are located in southeast Michigan. Therefore, it is possible that although the County may lose interior trim manufacturing, it may experience an increased concentration of headquarters and research and development employment.

Table II.6 shows the technology panel forecast for component and subassembly production location in North America. The Big Three are expected to decrease sourcing from the United States., and increase sourcing from Mexico. The recent devaluation of

the Mexican peso adds a significant degree of uncertainty regarding component production location in North America. However, many factors influence sourcing strategies, including transportation costs, delivery time, proximity of the source to the assembly plant for problem resolution, and the ability of the source to support design and development. Also, as productivity improves there is less reason to seek out low labor cost areas. Furthermore, assemblers and suppliers will increasingly try to rationalize production across North America to maximize efficiency.

TABLE II.6
TECHNOLOGY-25

What percentage of components and subassemblies produced in North America do the traditional domestic manufacturers and foreign manufacturers source from each country currently and what percentage will they source in 2000 and 2005? Please use a dollar volume basis in estimating percentages.

Components Sourcing	Median Response*		
Big Three	Current	2000	2005
North American (NA) content			
United States	75%	70%	70%
Canada	15	15	15
Mexico	10	15	20

* Note: Due to the use of medians, sums may not add up to 100%.

The technology panel expects an increase in offshore component sourcing. The Big Three are expected to increasingly source parts form low cost bases such as Eastern Europe, Asia Pacific, and South America. The panelists expect offshore purchases of automotive tooling to increase somewhat in the coming decade.

Vehicle Assembly

There are several potential long term changes in vehicle assembly, yet it is likely that the assembly plant of 2005 will closely resemble current facilities. A major factor in vehicle assembly is body assembly. The Delphi panel does not see substantial changes in body assembly in the coming decade, with one possible exception--the emergence of aluminum to replace steel as the material for body structure.

The materials panel forecasts a continued dominance of the unibody construction for passenger cars and minivans, and an increasing share of unibody construction in sport utilities in the coming decade (table II.7). However, the panel forecasts little change for pickups, expecting them to continue to be separate body/frame construction. Therefore, there will be little pressure, at least from the standpoint of the body assembly to drastically change the current assembly paradigm.

There are many hybrid frame designs throughout the industry, and there will likely be many more in the future. Although the panel forecast calls for the design mix to remain relatively stable over the next decade, it will be important to remain informed on the variations that develop. These hybrid frame designs might prove to be the initial steps

in subsequent significant changes in design and manufacturing. Remember a major river starts as a trickle.

TABLE II.7
MATERIAL-29

What percentage of North American-produced passenger cars and light trucks will use an integral frame or other design in 2000 and 2005?

	Median Response		
Frame Construction	1994*	2000	2005
Passenger Cars			
Integral body/frame or unibody	91%	91%	90%
Separate body/frame	5	4	3
Space frame	4	5	8
Sport Utility Vehicle			
Integral body/frame or unibody	19%	25%	30%
Separate body/frame	81	75	70
Space frame	0	0	0
Pickup			
Integral body/frame or unibody	0%	0%	1%
Separate body/frame	100	100	93
Space frame	0	0	0
Minivan			
Integral body/frame or unibody	58%	65%	73%
Separate body/frame	31	25	14
Space frame	11	10	13

*Source: Ward's Automotive Reports, December 26, 1994

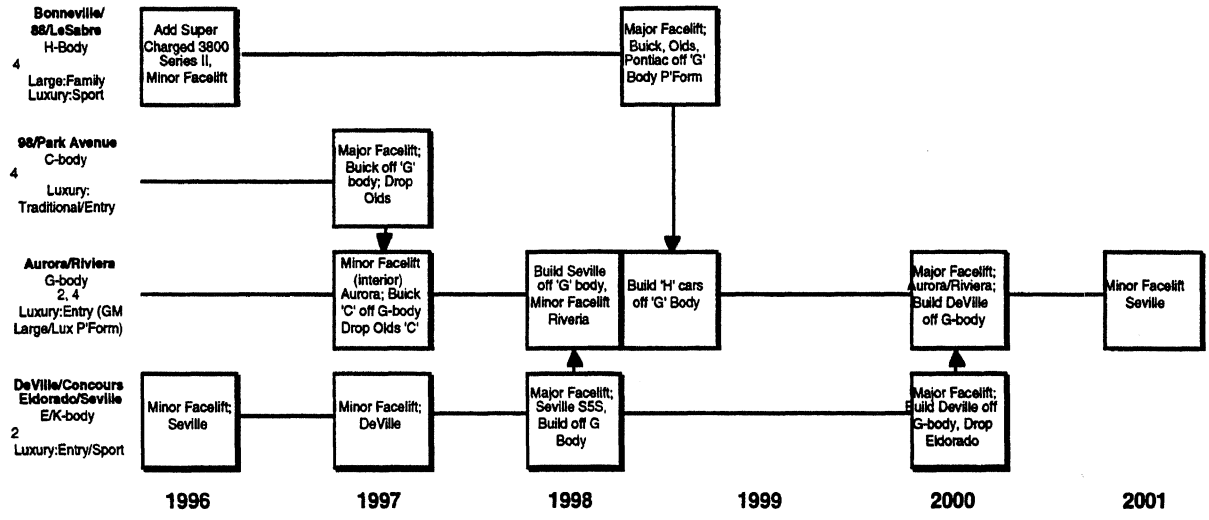
The panel forecasts steel to remain the dominant material through 2005, but they expect aluminum to be used to a small extent in both unibody and space frame constructions. They forecast no applications of plastic frame/structural members over the same period. The possibility of aluminum frame applications is of special importance to Wayne County. The Chrysler Conner Avenue assembly facility will soon begin production of the Plymouth Prowler, an aluminum-intensive program intended to give the company experience in alternative body assembly materials. Keep in mind that economics will continue to favor the use of low cost materials, i.e., steel.

Big Three Product Changes.

General Motors-Hamtramck: nearly 100 years ago, Lealand Motors built the first Cadillac in Wayne County, and it appears the tradition will continue well into the next century. The Hamtramck assembly facility will be the sole source for all North American produced Cadillacs for the 1997 model year. Furthermore, the recent investment of approximately $250 million in a new body shop insures that the facility will have the flexibility to produce all General Motors G-body vehicles, in addition to the Cadillacs. Figure II.1 shows the expected consolidation of General Motors large car platforms from four in 1996 to one in 2000. Hamtramck assembly, Flint Buick City and Orion Township assembly currently produce large cars. Because Hamtramck, and Orion Township have received the flexible body assembly tooling required to produce the entire line of vehicles, the future of Buick City is unclear. It is possible that the Hamtramck and Orion

Township facilities could go to a three crew-two shift schedule, and allow General Motors to close the Buick City facility.

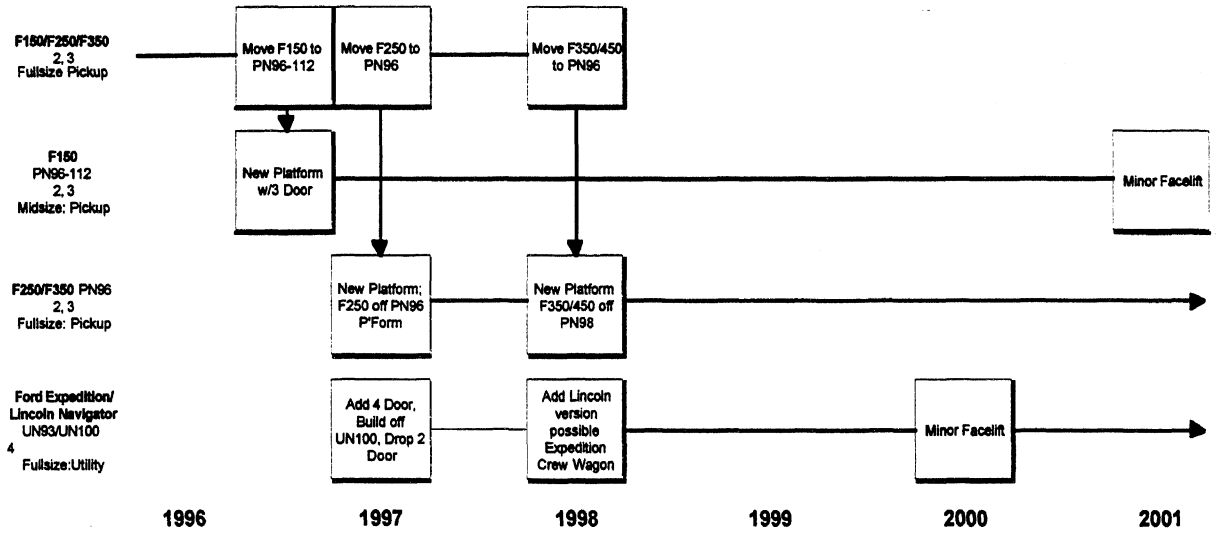
FIGURE II.1
GENERAL MOTORS VEHICLE PRODUCT TIMING



Chrysler: Wayne County has two of Chrysler's most important assembly facilities. The North Jefferson Avenue plant that produces Grand Cherokees is Chrysler's newest assembly facility, and the Viper Conner Avenue assembly plant serves as the company's manufacturing laboratory. The North Jefferson facility will likely remain in a strong position as long as the market for light trucks remains positive. The Conner Avenue assembly facility will add an assembly line for production of the Plymouth Prowler in 1997. Although this facility does not employ nearly as many persons as the traditional mass production assembly facility, it should be viewed as an important part of Wayne County's automotive endowment. The reduced complexity and smaller scale of the plant allow for visitors to gain a better grasp of the elements of an automotive assembly facility. The Conner Avenue plant should be an important visit for any school-to-work or manufacturing awareness programs. Wayne County should work closely with Chrysler to develop education programs that include this facility as an introduction to the automotive assembly process. A suggested program would include a visit to Conner Assembly to see a basic vehicle assembly, and a follow-up trip to a mass production facility like the North Jefferson plant.

Ford: Ford has significant assembly plant investment in Wayne County. Not only does it have three of its own assembly facilities, but it also has 50 percent ownership in AutoAlliance. Michigan Truck, in Wayne, produces F-150 pick up trucks and will soon begin production of the Expedition/Navigator, a full size sport utility. With a product that has been the best selling vehicle in America over a decade (F-150), and a new product (Expedition/Navigator) that has received very positive initial reviews, the future of Michigan Truck appears to be extremely stable. Figure II.2 shows the expected product plans for Michigan Truck Assembly.

FIGURE II.2
FORD MOTOR COMPANY VEHICLE PRODUCT TIMING



Conversely, the Dearborn Assembly plant, which produces the Mustang, has been operating well below capacity for several years, and does not appear to be in line for any new products. This facility has been rumored to be a candidate for closing for over a decade, yet apparently remains in Ford's future plans. The final Ford Assembly facility produces the Escort Tracer also assembled in Wayne County. The Escort and Tracer received a mild change for the 1997 model year. Ford is expected to introduce a new Escort platform by 2000.

AutoAlliance, the Flat Rock facility jointly owned by Ford and Mazda presents a potentially volatile product future. Ford will end production of the two-door Probe in 1997. However, it is likely that the company will replace it with a variant of the CDW27 (Contour/Mystique) platform. The Future of Mazda's two vehicles, the MX-6 and 626 is still unclear. There is some likelihood that the MX-6 will be dropped, and a CDW27 based 626 will continue to be built at AutoAlliance. It is also possible that a Mazda engineered 626 will still be built at AutoAlliance.

Engine assembly

Wayne County has strong representation in engine assembly. The Big Three have five engine assembly facilities that employ a total of 8,761 people. Chrysler has two facilities, with a third scheduled to open in late 1997. General Motors also has two engine facilities, and Ford has one.

Trends in engine assembly

Technology panelists forecast that nearly half of all engines will undergo major redesign by 2005 (table II.8). Major redesign of nearly half of all engines in the industry in a 10-

year period is a major undertaking. It will require a large expenditure of dollars and human resources. At the same time that engines are being redesigned, major calibration and development work will be required to comply with more stringent emissions and fuel economy standards. Table II.9 shows the current and expected engine programs for Wayne County's engine facilities. It is apparent that the County will see significant investment in the next five years.

TABLE II.8
TECHNOLOGY-56

What percentage of current North American-produced engines will undergo major redesign (> 30 percent of the investment cost of a new engine) by 2000 and 2005.		
North American-Produced Engines	**Median Response**	
	2000	**2005**
Four-cylinder engine	30%	50%
V-6 engine	30	50
V-8 engine	20	35

Because of the strong market demand for light trucks, the Big Three have faced a shortage of larger engines. Each of the manufacturers face a shortage of V8 engines. However, with the exception of the New Mack Avenue V8 engine plant that Chrysler is planning to open in 1997, it is not likely that there will be increased investment.

Another critical trend in engine assembly is increased flexibility. Ford has invested heavily in a modular engine program to allow the company to meet expected future increases in CAFE, while maintaining the ability to meet market demands. The modular engine program is based on achieving flexibility by using similar bore geometry within the engines families. The Dearborn engine facility has yet to be converted to the modular engine program. The engine currently produced at Dearborn will possibly be replaced by a new 1.8 liter, four-cylinder engine in 1999.

Chrysler has also chosen to pursue a flexible engine strategy, although the extent of that flexibility is not certain. It is likely that the new V8 family to be produced at Mack Avenue will share some design features with the new V6 family to be produced at Kenosha, WI. This suggests that the new Mack facility may have the flexibility to switch to more fuel-efficient V6 engines if market demands change.

TABLE II.9
BIG THREE ENGINE PROGRAMS IN WAYNE COUNTY

Displacement (liter)	Type	Change	Approx. Capacity	Production Location	Comments
Chrysler Corporation Engines					
2.0	I4	1996	500,000 (est.)	Trenton/Tuluca Mex.	Introduce in Neon, 1994 MY. Possible longitudinal application for Jeep ('96). High output derivative for Neon ('98).
2.4 (new)	I4	New 1995	250,000	Trenton/Tuluca	Build off 2.0 for JA and NS.
3.3	V6	Drop 1997	400,000	Trenton	Drop in 1998.
3.5	V6	Redesign 1998	84,072	Trenton	Possible Minivan application. May be dropped in LH program. Will likely be redesigned for Grand Cherokee.
3.8	V6	Drop 1998	40,000	Trenton	Could be dropped before 1998.
3.9	V6	Redesign 1997	400,000	Mound Road	Emission improvements in 1997.
4.0/4.2 (new May be 4.9 V8 and 3.7 V6 derivative)	V8	New 1998	N/A (600,000)	New Mack Plant	This program will likely reach production by 1997 calendar year. Build car version at Kenosha off 3.3 block First for LHS, then move to Mack for truck version
5.2 (truck)	V8	Redesign 1997	150,000	Mound Road	Emission improvements in 1997.
8.0(car/ truck)	V10		12,000	Mound Road	Ram 300 production will add to small 1993 volume.
2.0	I4	1996	500,000 (est.)	Trenton/Tuluca Mex.	Introduce in Neon, 1994 MY. Possible longitudinal application for Jeep ('96). High output derivative for Neon ('98).
2.4 (new)	I4	New 1995	250,000	Trenton/Tuluca	Build off 2.0 for JA and NS.
3.3	V6	Drop 1998	400,000	Trenton	Drop in 1998.
3.5	V6	Redesign 1998	84,072	Trenton	Possible Minivan application. May be dropped in LH program. Will likely be redesigned for Grand Cherokee.
3.8	V6	Drop 1998	40,000	Trenton	Could be dropped before 1998.
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5.2 (truck)	V8	Redesign 1997	150,000	Mound Road	Emission improvements in 1997.
8.0(car/ truck)	V10		12,000	Mound Road	Ram 300 production will add to small 1993 volume.
Ford Motor Company-Engines					
1.8	I4	New 1999	400,000	Dearborn	Replacement for 2.0L.
1.9/2.0	I4	Redesign 1997	400,000	Dearborn	Redesign for Escort/Tracer.
General Motors Corporation Engines					
4.3	V6	Redesign 1996	750,000 950,000	Romulus, Tonawanda	Major changes similar to GEN III program. Little volume change expected.
Northstar 3.X	V6	New 1998	700,000	Livonia, Flint	Will be built off Northstar. Expected to be used in W car and G car
4.0/4.6 (Northstar)	V8	Redesign 1997	120,000	Livonia	Major redesign in 1997 model year.
Source: OSAT Engine Timing Charts, April 1996					

Engine Components

The county has 17 engine component facilities, employing approximately 2,500 persons. This sector could see significant change in the coming decade. The desire to improve fuel economy by using more lightweight materials will continue to be challenged by the need to reduce cost. Engine materials that can reduce weight, while still achieving cost targets will likely see increased penetration.

The industry is substituting lightweight materials for cast iron and steel in engine applications. Many components will likely undergo significant changes in materials over the coming decade. As these components reach manufacturing scale economies, components made from these replacement materials could become the industry standard. It is interesting to note that for many of these components, the Big Three may lay the off-shore companies in converting to lightweight materials. This may present problems for engine component suppliers in Wayne County. Off-shore suppliers may have greater experience with replacement materials, thus making it difficult for domestic suppliers to be competitive. Table II.10 shows the materials forecast for selected engine components.

TABLE II.10
MATERIAL-22

For the following North American-produced passenger car and light truck engine components, please indicate what percentage is likely to be made from the listed materials currently and by 2000 and 2005.

Component Material Internal	Median Response		
	Current Est.	2000	2005
Crankshaft			
Cast iron	80%	70%	62%
Steel	20	30	38
Connecting Rod			
Aluminum	0%	0%	0%
Cast iron	28	20	10
Metal matrix composites	0	0	5
Powdered metals	30	45	53
Steel	40	35	28
Fuel Rails			
Steel	90%	80%	64%
Plastic	10	20	36
Piston			
Aluminum cast	100%	90%	75%
Aluminum reinforced	0	5	8
Hybrid (e.g., plastic skirt/ceramic crown)	0	0	0
Metal matrix composites	0	1	13

Engine emission controls may not offer a manufacturing opportunity for Wayne County, but the sector does present a significant opportunity for increased engineering

employment. There is significant effort by the industry to develop low emissions vehicles (LEV), ultra-low emission vehicles (ULEV), and zero emission vehicles (ZEV). Much of this work is currently in the development phase. With proximity to each of the Big Three, and several foreign technical centers, and the Federal Environmental Protection Agency Mobile Source Testing Facility, Wayne County may be the ideal location for companies involved in the development of engine emission control product.

Although the Delphi VIII panel does not forecast a major shift to alternative fueled vehicles in the coming decade, it does expect continued development activity. In an attempt to lessen the economic impact of reduced government defense spending, the state of California has actively promoted the development of electric vehicles in southern California. This is a direct challenge to southeast Michigan for future leadership of the automotive industry. Although this effort has seen some success, it is apparent that much of the electric vehicle research will be done by the Big Three in existing southeast Michigan research facilities.

The technology panel has very high expectations for electronics in other areas of the vehicle as well. The cost of electronics as a percentage of total vehicle cost is forecast to increase from 15 percent currently to 20 percent in 2005 (table II.11). This is in spite of the general decline in the cost of electronic components. The expected increase in electronic content, therefore, is greater than the forecast for decreased cost.

Much like engine emissions management, Wayne County is not well positioned for growth in electronics manufacturing. However, many companies headquartered in Wayne County will be integral parts of the design and development of automotive electronics.

TABLE II.11
TECHNOLOGY-73

What percentage of total vehicle cost of North American-produced passenger cars will electronic componentry comprise currently and in 2000 and 2005?			
	Median Forecast		
	Current Est.	**2000**	**2005**
Electronic componentry as percentage of total vehicle cost	15%	18%	20%

By customer demand, cost is being added in several areas of the vehicle to improve vehicle safety. It is likely only a matter of time before several intelligent transportation systems technologies will be adopted in significant numbers. Panelists forecast that the initial applications will occur in the next decade (table II.12). The demand for these items may very well surprise the industry in the next decade, as did airbags and antilock brakes in the 1990s. Again, however, cost is an increasingly important concern for future vehicle sales, and the customer will be looking for the greatest value in new features.

TABLE II.12
TECHNOLOGY-51

What percentage of vehicles produced in North America will have the following Intelligent Transportation Systems America (formerly known as IVHS) by 2005?	
	Median Response
ITS Systems	**2005**
Adaptive cruise control	10%
Collision warning systems	5
Automatic toll collection	6
Navigation	10
In-vehicle message system	10

Interior Systems

Marketing panelists identify a number of areas where there will be shifts in responsibility within the value chain. Overwhelmingly, panelists predict that first-tier suppliers' value-added will increase in all four functional areas of vehicle assembly and components (table II.13). In electronics and interior components, second-tier suppliers are also expected to add more value than they do presently. In some cases, the increasing value of the suppliers' contribution may be offset by a diminishing contribution from the vehicle manufacturer. Nowhere is this shift in responsibility more apparent than the in automotive interiors industry. In fact, in many ways the sector is the first to go through this consolidation and develop a system integrator strategy. Two companies with Wayne County ties appear to be the leaders in this change. Lear Corporation and Johnson Controls have positioned themselves to be two of only a handful of companies in North America that will be capable of supplying entire interiors systems.

TABLE II.13
MARKETING-57

Considering the next 10 years, please identify the changes in value-added by each industry participant you expect at each functional stage.				
SCALE: 1 = value-added sharply increasing 3 = remains the same 5 = value-added sharply declining				
Changes in Value-Added	**Design**	**Product Engineering**	**Manufacturing**	**Assembly**
Vehicle Assembly				
Vehicle manufacturer	3.1	3.4	3.2	2.9
1st tier supplier	2.0	1.9	2.3	2.2
2nd tier supplier	2.6	2.4	2.6	2.9
Engineering service firm	2.6	2.5	2.8	2.9
Powertrain				
Vehicle manufacturer	2.8	2.8	2.9	2.8
1st tier supplier	2.3	2.1	2.4	2.5
2nd tier supplier	2.7	2.6	2.7	2.8
Engineering service firm	2.7	2.7	2.9	3.0
Electronics				
Vehicle manufacturer	3.1	3.2	3.4	3.3
1st tier supplier	1.8	1.7	1.9	2.0
2nd tier supplier	2.4	2.3	2.4	2.4
Engineering service firm	2.7	2.7	2.9	2.9
Interior				
Vehicle manufacturer	3.3	3.5	3.7	3.5
1st tier supplier	1.8	1.8	1.8	1.9
2nd tier supplier	2.4	2.4	2.4	2.5
Engineering service firm	2.7	2.6	2.9	3.0

It is likely that Wayne County will not see increased growth in manufacturing of interior components, but may be positioned to gain increased technical and managerial employment from these companies. As these systems integrators acquire production capabilities--usually by purchasing existing part suppliers--plants, management and engineering staffs will be consolidated. Labor cost will likely be a major determinant in plant closure decisions. However, management and engineering will likely be concentrated in southeastern Michigan. As systems integrators become more dominant, it is likely that Wayne County will see increased management and engineering employment, but less manufacturing employment.

Suspension/Steering

Wayne County has a long history of suspension and steering supplier representation. That history took on a new look recently. American Axle, formerly a part of GM, has become a spinoff success story. The new company has established itself as a viable, important member of Wayne County's automotive endowment. American Axle has shown a commitment to employees, and the community that stands as an example for other companies.

It is interesting to note that the two GM spinoffs located in Wayne County, American Axle and Detroit Diesel, are experiencing great success. The management of these companies has proven that established facilities in urban locations can be made competitive given proper guidance and new investment.

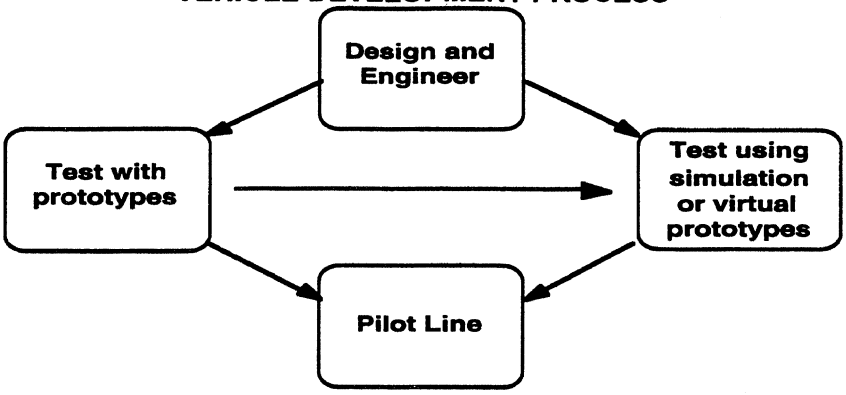
Tool and Die, Special Tool and Prototype Facilities

The tool and die, prototyping and special tooling, engineering service firms, and supplier research and development facilities all face several critical factors that will influence their future. For the past decade, the automotive industry has been moving toward a reliance on virtual prototype engineering, or virtual prototyping. It appears that this ability to design, engineer, and test a product entirely on the computer may be much closer to reality than it was just a few years ago

The automotive industry has traditionally built prototype components and vehicles to verify design and engineering. Although each of the Big Three have in-house prototyping capabilities, they have relied heavily on independent tool and die, and special tool companies to manufacture prototypes. These companies are a critical part of Wayne County's unique supplier base. However, the recent advances in virtual prototype engineering may put these companies at risk. It is possible that in the near future the prototype will be the first vehicle off the assembly line. That would have a profound impact on those companies that have traditionally supplied prototype tooling and prototype parts to the industry.

Delphi panelists expect the vehicle development process will take approximately 13 fewer months in 2005 than currently. Advances in computer-aided design, engineering, and manufacturing will reduce the total resources required to execute a program by changing the way companies develop vehicles (Figure II.3). To emphasize the potential importance of this change, Ford recently announced the layoff of 6,000 contract engineers, and a plan to reduce prototypes by two-thirds. It is apparent that the automotive product development process is rapidly changing. Through the increased use of virtual prototype engineering, automakers are decreasing the need for some traditional engineering skills while simultaneously experiencing severe shortages in such areas as computer aided engineering, systems engineering and software development. If virtual prototype engineering becomes a reality, special tool and prototype building may become akin to the buggy and whip industry.

FIGURE II.3
VEHICLE DEVELOPMENT PROCESS



For a case study on the effect of virtual prototype engineering, Wayne County might closely study the results of the Boeing Corporation's most recent product, the 777. The much publicized 777 was the first Boeing aircraft developed entirely on a computer screen. By designing the aircraft with computer-aided design and engineering, and testing it using virtual prototypes, the company reportedly saved millions of dollars, and employed significantly fewer people on the program. The 777 and its effect on the structure of Boeing have significant implications for the automotive industry.

Engineering Service Firms and Supplier Research and Development Facilities.

Engineering service firms will also be affected by virtual prototype engineering. Virtual prototyping has the potential to greatly reduce the number of engineers required to develop a vehicle, therefore engineering service firms and supplier research and development activities may see decreased activity in the future. As with many new technologies, the effects may not fully be realized for several years. And the new skill set required may present an opportunity for proactive educational systems.

The technology panel rated the current and future supply deficiencies for selected engineering/technical occupations. Panelists forecast that the deficiency in skilled personnel will change little by 2005 from what it is today. For all areas listed, the current supply deficiency is rated as somewhat severe (table II.14)

TABLE II.14
TECHNOLOGY-84

Please indicate your estimate of supply deficiencies for the following skill areas and job functions.		
Scale 1 = extremely severe		5 = not at all severe
Occupation/Training	**Current Rating**	**2005 Rating**
Engineer		
Chemical	3.5	3.2
Electrical	2.8	2.5
Industrial	3.4	3.2
Manufacturing	2.6	2.5
Materials	3.0	2.8
Mechanical	3.0	2.8
Systems	2.4	2.3
Designer	2.9	2.8
Software writer/designer	2.6	2.5
CAD/CAM/CAE	2.6	2.6
Electronics technician	2.7	2.4
Service technician	2.8	2.5
Skilled trades	3.1	2.7

It is apparent in industry and education today that many, if not most, of the highly technical people working and studying in the United States are not originally from the United States. Many of the brightest students from the United States are choosing other fields of study that offer greater monetary rewards. Eager students from other countries are filling the void. It is the challenge of the educational system and industry to rekindle the young students interest in technical fields.

Technology panelists were also asked what new skills will be required in their organizations in the next decade, and what educational changes should be made to provide these skills. The panelists gave a wide range of new skills and improvements in current skills that will be required in the next decade. These comments cover virtually all aspects of engineering and business including people skills, understanding diverse cultures, materials, processes (engineering and manufacturing), design, computer applications, prototyping, reliability, organizational development, new technologies, cost/value relationships, manufacturing, customer requirements, project management, cross-functional requirements and systems engineering (see appendix VI.1).

Many of the comments relate to changes required in engineering and business colleges at the undergraduate or graduate level. Many others, however, relate to ongoing education required to keep engineers and managers up-to-date on rapidly changing technology and organizational philosophies.

All businesses will be required to assure that the skills noted are present and current in their organizations in order to be competitive in an increasingly competitive global market. The educational system must be ready to provide up-to-date ongoing education in all of the areas mentioned. Automotive-industry-defined school-to-work

issues are reviewed in section III of this report. However, it is important for Wayne County to develop a parallel program in work-related education and training. As the Delphi respondents point out, industry will be changing at such a rapid rate, employees will be forced to update their skills on a regular basis. Furture work-related education and training will no longer be only for the underemployed, but for all of those that wish to remain gainfully employed.

Recommendations

The industry will undergo much change in the coming decade—some evolutionary, some revolutionary. Based on trends identified in the Delphi VIII Forecast and Analysis of the North American Automotive Industry relative to Wayne County's current automotive endowment, there are several recommended actions for Wayne County.

1. Establish relationships with Big Three assembly and powertrain facilities.

   Wayne County has a significant amount of Big Three assembly and powertrain investment. These facilities employ nearly 40,000, or 2,600 per facility. It benefits the County to establish close relationships with these facilities. The County should attempt to develop and maintain relationships at the corporate and facility level. Although most decisions, even those regarding county level issues, are made at the corporate level, contact with the individual plants may give Wayne County economic developers insight into the critical issues, facing the most critical facilities. The insight may allow the County to address issues before they become major hurdles to new investment.

2. Become proactively involved in the industry's shift to computer simulation.

   As the industry shifts to computer based simulation testing and verification, Wayne County potentially could see significant employment loss. Computer based simulation, or virtual prototyping, has the potential to affect tool and die and prototype shops, as well as Big Three and supplier engineering.

   Much like the industrial parks of twenty years ago, the County has the opportunity to develop *think parks*. There are many small, but rapidly growing computer simulation companies that may be potential occupants of a research park.

3. Prepare residents for the evolutionary skills requirements, but plan for the revolutionary skill requirements.

   The automotive industry will experience change at a rapidly increasing pace in the coming decade. Technology will influence all aspects of the industry. Wayne County must be keenly aware of the changing skills and needs of its largest industry. A formal dialogue between work-related

education and training program managers and industrial resources representatives should be developed. Community colleges and other work-related education and training programs should be reviewed by industry on a regular basis to ensure that they meet the skill requirements of industry.

Change in this industry may come from many areas. Computer-based engineering, new materials, alternative vehicles, or new manufacturing technologies are just a few of the potential revolutionary changes that may occur.

3. Use the automotive endowment as an extension of the class room.

   Many residents of Wayne County have never been inside an automotive assembly facility. Tours are a necessary way to break down barriers between industry and education. A plant tour combined with class room assignments is an excellent way to increase awareness. Yet plant tours should not be limited to the school-to-work programs. An overall increased awareness is an essential part of an automotive economic development strategy.

4. The County must work to attract and retain system integrators.

   Although it is likely that the county will see decreased manufacturing in several sectors, there is potential for growth in engineering and administration. As the industry goes through a restructuring, engineering work will likely be concentrated at the system supplier level. It is possible that these system integrators will increase drastically in size as the restructuring continues. This presents an opportunity for Wayne County, in large part because several of these firms already have a presence in the County. A major effort should be made to develop dialogues with these companies.

5. Wayne County must work with the Big Three to promote the development of alternative fueled and advanced technology vehicles.

   The industry has recently began to invest heavily in the development of alternative fueled vehicles. The County must recognize that alternative fueled vehicles and advanced technology (both product and manufacturing technology) present an opportunity for increased investment and over the long term, a threat to the existing production system. The state of California has put considerable effort into the development of an electric vehicle industry. This represents a direct threat to Wayne County's economic base, and should be monitored.

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III. Automotive Skill Initiatives: Big Three Consensus

The Office for the Study of Automotive Transportation (OSAT) recently completed a study for the Michigan Automotive Partnership (MAP), which forecast 109,000 to 129,000 Big Three job openings in Michigan between 1995 and 2003. This figure translates to over 12,000 hires per year by the state's largest automotive firms. The implications for Wayne County are obviously positive, but our MAP study also indicated the likelihood of higher qualifications for future Big Three hires. Given recent shortages of higher quality labor in state labor markets in recent years, it is apparent that a major focus on automotive skills initiatives may be in the best interests of many of our state's major metropolitan regions. Our current study's purpose is to begin to identify skill and education initiatives which could ensure that Wayne County retains or increases its share of Michigan and U.S. automotive employment.

OSAT traditionally has used consensus methods of research to explore public policy, technology, and general business issues of concern to the automotive industry. This method collects information about industry practice, policy, and expectations from corporate managers and staff directly involved in the focus research area. In this study, OSAT was asked to investigate, through a series of special interviews, the potential for a consensus on the strategic requirements and scope of automotive, school-to-work programs, trade academies, and other automotive skill initiatives in Wayne County. Our study of current and future automotive human-resource issues employs the consensus research method.

For the purposes of this study, OSAT identified a number of key human-resource and government-affairs executives at each of the major automakers whose current role involves the representation of the company, formally or informally, in the area of public skill and education programs directed towards the automotive industry. We asked for the assistance of these executives in order to gain direct advice and critical comment on Wayne County's design of automotive skill initiatives, and to identify current, successful training and education programs that may serve as useful models. Even more critical to the purposes of this study was an evaluation by the executives of the required elements for success of such programs.

With one exception, the interviews were held at company locations, and each lasted for about two hours. A list of recommended discussion issues or questions was circulated prior to the interviews. The vehicle firm participants were not restricted in their comments on the circulated list of topics. In fact, in each interview, respondents quickly developed their own emphasis on critical issues and concerns related to automotive skill initiatives at their firm.

OSAT staff compiled two or three individual records of each interview. A report was prepared by comparing the frequency and elaboration of concerns and examples mentioned, central issues highlighted, and level of perceived importance of specific issues. Based on these comparisons, a narrative was produced from the input of trip

reports prepared by OSAT staff. The content of the final consensus report is heavily dependent on OSAT's past experience in gathering executive opinion.

A draft report of the results of the focus discussions with all three vehicle producers was sent to our primary study participant at each firm. This contact was asked to circulate a copy of the draft report to all participants within the firm. Participants were asked to edit and review the entire report. They were also asked for any general comments or additional details they could provide regarding the issues described in the report. These comments and changes were then collected and incorporated into the final report.

The remainder of this report consists of summaries of discussion taken directly from the interviews with the automaker participants. These summaries depict the statements, reflections, and opinions of the respondents that were interviewed and, we believe, of their respective firms. If the consensus on an issue was not unanimous, we attempted to express differing opinions as completely as possible.

Consensus across the participants and the firms was not always achieved on every issue. As a result of these differences in opinion, we have sometimes expressed individual company experience and opinions on various issues separately in the discussions below.

As noted earlier, the focus groups were prompted with a variety of issues developed by OSAT staff to guide the interviews. These issues are listed in the summary discussions below. As we also note, participants were not restricted to these issues and were allowed to develop any topic they wished. The major areas of discussion that the vehicle producers brought up follow and are discussed in the remainder of this report.

A. Standards and Needs

- *Required knowledge and the importance of labor quality*
- *Current Wayne County student performance*

B. Linkages and Extensions

- *Current interaction with schools*
- *How should, or could, this interaction be changed*
- *Expectations regarding school-to-work programs*
- *Ideal definition of school-to-work programs*
- *Practical design of school-to-work programs*
- *Barriers to implementation*
- *Company commitments*

C. Patterns of Success

- *Identification of successful existing programs*
- *Elements of success and recommendations*

A. Standards and Needs

- *Required knowledge and the importance of labor quality*

Respondents to this study directed their attention to the education primarily of K-12 students who might apply for positions in production occupations at their firm. Specific references or comments to actual curricula or the content of education programs were rarely offered, aside from stray comments such as a "firm grasp of pre-algebra arithmetic." Instead, those interviewed spoke out strongly on the current and future needs of their firms for workers who have mastered certain basic skills.

All respondents stated that their firms were looking for graduates who can "read, write, compute and reason." One respondent spoke further of the need for students "who have learned how to learn, who want to learn and who have embraced continuous learning." This respondent said that the extent of functional illiteracy in his firm's current labor force first became apparent with the attempt to implement statistical process control methodology (SPC) in production operations. It became quickly apparent that the corporation needed more than a "warm body" in the workforce. Something must be done, it was agreed, about the general quality of the applicant pool for the three companies. One firm did supply a detailed employability skills profile developed in partnership with the Michigan Employability Skills Task Force. This listing of academic, personal management and teamwork skills is reproduced in Exhibit III.1.

Exhibit III.1
EMPLOYABILITY SKILLS PROFILE

Three Categories of Skills That Will Be Required of Workers in the Future:

ACADEMIC SKILLS	PERSONAL MANAGEMENT SKILLS	TEAMWORK SKILLS
(Those skills which provide the basic foundation necessary for a person to get, keep and progress on a job)	(Those skills related to developing the attitudes and behaviors required to get, keep, and progress on a job)	(Those skills needed to work with others on a job)
EMPLOYERS WANT A PERSON WHO CAN:	**EMPLOYERS WANT A PERSON WHO CAN:**	**EMPLOYERS WANT A PERSON WHO CAN:**
O Understand spoken language and speak in the language in which business is conducted. O Read written materials (including graphs, charts and displays). O Write in the language in which business is conducted. O Understand and solve problems involving basic arithmetic and use the results. O Use the tools and equipment necessary to get a job done. O Access and use specialized knowledge when necessary (e.g., the sciences or skilled trades) to get a job done. O Think and act logically by using the steps of the Scientific Method (i.e., identify problems, collect information, form opinions and draw conclusions).	O Identify personal job-related interests, strengths, options and opportunities O Demonstrate personal values and ethics in the workplace (e.g., honesty, fairness, and respect for others). O Exercise a sense of responsibility. O Demonstrate self control. O Show pride in one's work. O Be enthusiastic about the work to be done. O Follow written or verbal directions. O Learn new skills and ways of doing things. O Identify and suggest new ideas for getting a job done. O Be a leader or a follower depending upon what is necessary to get a job done.	O Identify with the goals, norms values, customs and culture of the group. O Communicate with all members of a group. O Show sensitivity to the thoughts and opinions of others in a group. O Use a team approach to identify problems and devise solutions to get a job done. O Exercise "give and take" to achieve group results. O Function in changing work-settings and in changing groups. O Determine when to be a leader or a follower depending upon what is necessary to get a job done. O Show sensitivity to the needs of women and ethnic and racial minorities. O Be loyal to a group.

Source: Michigan Employability Skills Task Force - October, 1989

Another respondent declared that the speed of technological change has forced his company to extend its horizons in the area of labor quality. He stated that the life of a given automotive production technology was once 20 years, yet by 2000, change will occur every two to three years. By 2005, he further stated, it is expected that the basic technology will change every 12 to 14 months. It was strongly maintained by all respondents that basic literacy and computer literacy will be future requirements of

"even the most manual of jobs." "Currently," it was added, "applicants without a high school diploma do not enter our work force."

Several respondents stated that higher levels of labor quality will be needed in every occupation within their firms. Skilled trade workers of the future must be more broadly trained. Engineers must become increasingly language adept and multicultural —able to speak Spanish when assigned to operations in Mexico or communicate with German or Japanese colleagues if the need arises. The U.S. motor-vehicle industry's major international competitors, it was stated, do not face a literacy problem—and their engineers read and speak English. Finally, it was stated bluntly by one corporation that "it is extremely important to the company that there is a supply of skilled tradespeople and a quality production labor pool to select from if we are to remain competitive."

- *Current Wayne County student performance*

Respondents generally avoided any discussion of their firm's specific experience with Wayne County students. Instead, they directed their comments to the quality of K-12 graduates nationwide—and quickly focused their discussion on the inadequacies of current K-12 education. One respondent stated that functional illiteracy is hardly just a problem in Wayne County—20 percent of the U.S. population is functionally illiterate. A second corporation reported that Wayne County K-12 graduates "perform competitively with other areas of the state (Michigan)." On the other hand, another respondent pointed to the U.S. auto industry's recent improved performance and sadly noted that Wayne County should be the manufacturing capital of the world, not a county with a chronically higher-than-average unemployment rate.

Several respondents stated that many current job applicants cannot complete or even read their application forms—an all-too-frequent reality. These respondents blamed educators directly for the failed potential of graduates. They emphasized that, although parents and the home environment play a critical role in the performance of students, it is the job of K-12 education to prepare students, and this critically social role must start at a very early age.

It was stated that the educational system has disappointed students, not just employers. Textbooks were typically written 20 to 30 years ago. The system is driven by a 1940s mentality that directs the best 20 percent of students to college where less than 50 percent may graduate. This means 80 percent of students are treated as second-class citizens—directed to unfocused post-secondary programs or underfunded and inadequate vocational and technical education. Educators actually demonstrate an unreasonable fear of manufacturing technology. Too often, the industry receives the bottom 20 percent of graduates as applicants.[10] This has happened despite the fact that industry offers some of the highest paid employment, in the United States today.

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[10] Much has been written and said recently on the general subjects of employer dissatisfaction with job applicants and K-12 education. For additional discussion from the viewpoint of the auto industry, see

B. Linkages and Extensions

- *Current interaction with schools*

Big Three human-resource and government-relations executives directly interact with many of the major school districts in Wayne County—especially in the large communities of Detroit, Dearborn and Livonia. However, much of this interaction to date has been with officials, current and former, who hold the highest positions (e.g. superintendent or deputy superintendent) or with the staff of a handful of standout programs that have received heavy attention from the industry. One corporation described its interaction with the Wayne K-12 systems in terms of their participation or involvement in such programs as the Ford Academy of Manufacturing Sciences (FAMS), the Distributive Education Clubs of America (DECA), and its membership in the School-to-Work/Workforce Development Boards. At a higher level, this firm claimed to also interact with K-12 systems through its extensive participation in Michigan Business Leaders for Educational Excellence (MBLEE), and the National Employer Leadership Council (NELC). Unfortunately, interaction with the great majority of teachers, counselors or school administrators "in the field" has been so far necessarily limited. A critical need in the effective partnering of the industry and the K-12 systems is to foster a relationship with those actually involved in education and vice versa. A critical crosswalk between industry and education, it was said, was in the area of high school and middle school counseling.

The new federally sponsored and state administered school-to-work program has drawn a considerable amount of interest from the industry. However, as one government-affairs respondent put it, "The corporation initially became involved in school-to work to get additional 107a training grants." He added that the company has come to believe in the school-to-work concept—the question is how to do it. All in all, the respondents hailed school-to-work as an extremely positive development for the industry and its communities. Finally, business and education are in the same room and talking. Both have a common interest in the tremendous potential of linking education directly to work.

The companies will officially participate in the school-to-work effort as members of local workforce development boards. There is general agreement that Wayne County has constituted excellent workforce development boards. It is the companies understanding that the Governor of Michigan and the Director of the Michigan Jobs Commission consider Detroit's Board (the CEO being the mayor of Detroit) the best workforce

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Sean P. McAlinden, Brett C. Smith, et al., *Driving America's Renaissance, Human Resource Issues in Michigan's Automotive Industry*, Office for the Study of Automotive Transportation, Transportation Research Institute, The University of Michigan-Ann Arbor, UMTRI-95-37, pages 42-50, or for better writing, Meredith, Robyn, "New Blood for the Big Three's Plants," *The New York Times*, April 21, 1996, pages Section 3-1, 10-11.

development board in the state, especially in terms of business representation. However, there was some divergence between respondents on just how school-to-work and its effective interaction with Wayne County's auto industry should evolve both politically and practically.

One respondent stated a series of strong opinions regarding the political and practical realities of school-to-work in Wayne County. This corporation maintains that the many school systems of Wayne County (33-plus in Detroit) are pressing hard to control school-to-work funding and activity. These systems would like the money and the student placements to be split evenly, weighted by population (or politics). Unlike other smaller Michigan counties, Wayne County's Regional Educational Service Agency (RESA) cannot function as a powerful Intermediate School District (ISD) due to the overwhelming size of some its member schools. This respondent maintained that the private employers on the workforce development boards wish to allocate funding and activity on the basis of competition. The best programs with the best plans should receive funding through a competitive application process. This respondent claimed that employers and school systems are currently at odds due to dissimilar decision processes. School systems reach decisions through the time-consuming and inefficient process of stakeholder democracy, with much voting and discussion. Business, on the other hand, recognizes the scarcity and cost of managerial (and training) time and tends to make decisions quickly on the basis of facts. This respondent made a major practical point. He claimed that the bulk of regional automotive, as well as other nonautomotive, job openings will be located south of Flint and north of Detroit. Yet these middle communities all face severe labor shortages. The bulk of the available labor supply or potential student applicants may indeed be located in Wayne County. Jobs and applicants are thus geographically separated. This is a serious obstacle, especially in the case of implementing school-to-work programs. Student participants in the 11th and 12th grade may be required to travel, (spending half their day, five days a week) to a training location at another school or a Big Three facility many miles distant.

Not all students own vehicles. And for those that do, travel north of Eight Mile Road during the course of the week can be especially arduous, even dangerous, given their driving experience. Public transportation must be made available directly to school-to-work programs if they are to succeed. Several other respondents strongly agreed with this conclusion.

Finally, this respondent proposed the creation of a "super-workforce development board" that would represent all employers, auto and nonauto, in southeast Michigan. The role of such a "super" board would be to coordinate or allocate on some rational business basis the assignment of training slots and school-to-work funding for the entire region. This would help counter the political power of some large school systems, yet leave some room for local creative programming. Central to this concept is the reality of a single regional economy in southeast Michigan, with common goals and resources that must be efficiently shared. Another government affairs executive at one of the other companies saw much merit in this proposal but doubted that it could be brought about due to "existing political boundaries."

In contrast, respondents from the industrial-and employee-relations functions at two of the firms saw little need for a super workforce development board. Indeed, one of these respondents saw current workforce development boards as perhaps already too large for the practical purposes of implementing school-to-work programs in Big Three plants. These respondents said that local initiatives, based at each individual plant and tailored to needs of each plant and its labor force, seem to hold the greatest promise. They suggested that the auto industry focus its efforts on developing a shared general curriculum and finding the best possible plant programs for other plants to generally model.

One industrial-relations executive has already gained much experience at a number of existing, early school-to-work efforts outside of Wayne County. The best of these initial programs seems to suggest a very promising pattern for school-to-work programs based at Big Three facilities. Such programs could involve up to 100 11th and 12th grade high-school students per plant. These students would spend half their day (two to three hours) dedicated to manufacturing and trades training within the plant —and at least one full summer of training as well. Students would be assigned to UAW skilled-trades mentors to oversee their activities, perhaps under the joint guidance of a vocational-technical instructor from a local school. A common school curriculum such as Ford Academy of Manufacturing Science (FAMS) could be shared across the Big Three school-to-work programs. A major outcome of this program would be skills-based certification—a result of mastery of classroom and workplace-specific skills. The program could be best administered and supported primarily from the joint company-union, regional, human-resource centers or skill centers located within the larger plants.

At this time, of course, many questions remain concerning such programs. Students cannot be direct employees of the corporation or perform real work on their own. On the other hand, they can possibly work in parallel with their union-represented mentors. Most importantly, the companies cannot offer special hiring preferences to graduates of the programs. This would require, plant-by-plant, union approval. This is a key and overwhelmingly strategic issue relative to the adoption and extension of any practical school-to-work activity within the Big Three. If graduates are not granted hiring preference within Big Three plants, however, they still are likely to be strong candidates for placement at automotive suppliers, as well as in openings in other industries.

Local union participation on an equal, detailed, partnership basis in actual plant school-to-work programs is a virtual necessity. Job classifications and training requirements in Big Three plants are negotiated with union locals. To a certain extent, hiring procedures and preferences are also naturally subject to local union approval. The activities of skill trades workers are carefully and specifically negotiated in local agreements. The implementation of a school-to-work program within an actual Big Three plant, especially a program that might lead to preferences in hiring, is a highly complex, delicate process. This process would be very local in nature and might differ in many important characteristics between plants. It is absolutely critical that Wayne County give the

highest priority to a dialogue with not only regional and international union officials, but also with union leadership at the local level in the county's key automotive facilities.

It is hard to see how a distant, "super" employer-workforce development board could help in this process. In fact, it is likely that individual local unions may only wish to commit to individual local schools (and not even an entire school district). It is much less likely they would allow their plant-training slot allocations to be determined and filled by a regional authority. School-to-work must be allowed to evolve within the auto industry, and it must recognize existing workplace realities as well as future challenges. A careful, step-by-step model for plant-based school-to-work programs must be developed if Wayne County and other traditional Michigan automotive communities can look forward to the return of the trade and technical school programs.

It was mentioned that Ford Motor Company has already sponsored the development of an 11th and 12th grade curriculum for automotive skill initiatives (FAMS). At least one other major automaker intends to buy and use this program for students at this level. Two of the companies were willing to declare FAMS as an "ideal and proven successful school-to-work program with all the required success elements." This program was designed with the teamwork, communications, statistical processes, workplace technologies and applications skills needed "so that students would have that 'real work' exposure and learn its concepts early on." A description of FAMS is shown in appendix VI.2.

However, an important remaining task is the development of an industry awareness program for students in the 8th through 10th grades. Such a program would highlight industry careers and the need for students to master certain basic skills. For example, it was reported that pre-FAMS has indeed been developed and will be implemented at Cody and Kettering High Schools in Detroit in the fall of 1996. In fact, one respondent strongly encourages the development and implementation of a series of programs that would promote the development of work ethic and team work skills for students in the 3rd or 4th grade. Since Ford has already made the effort to develop one initial curriculum, the other two firms should take a major responsibility for contributing the investment needed for these additional programs for earlier grades.

C. Patterns of Success

- *Identification of successful existing programs*

Respondents in this study identified a number of standout programs in the automotive skills area. A number of the more famous of these programs are currently located in Wayne County. In particular, three programs in Detroit were highly rated by all three companies: the Breithaupt Center, the Golightly program, and the Focus-HOPE pre-employment program. The first program was highly lauded for its industry and technology awareness training, but is thought to be somewhat hampered by the lack of

a diploma. The last program, is thought to be a powerful model of a virtual "boot camp" in how to impart the right work ethics or work behavioral skills. However, one respondent thought that the technical training and skill levels of Focus-HOPE graduates are somewhat oversold by the program's administrators. Essentially, Focus-HOPE graduates are well qualified for initial training as production employees for the Big Three.

Also within Wayne County is an example of "best practice" curriculum development: the FAMS program. This program was launched as a Michigan public school academy on April 22, 1996 at Henry Ford Museum. The charter school will make use of existing faculty from Wayne County school districts and is open to all Wayne County students. This last feature may give the Henry Ford Academy a major advantage over charter trade schools located elsewhere in smaller Michigan counties. These other programs have experienced great difficulty in attracting sufficient numbers of quality students from smaller school populations. This should not prove to be a problem for an academy with the population coverage of Henry Ford. The standard and example set by this program for the rest of the industry cannot be underestimated.

A number of model school-to-work efforts and public programs were listed outside of Wayne County. The Flint Manufacturing Technology Center, supported by the UAW-GM-Flint Regional Human Resource Center, is a good early, local example of school-to-work training located within a Big Three facility. Similar efforts located at the General Motors Pontiac Truck Plant, and mentoring efforts supported by Macomb UAW skilled trades, also were praised. Public grade-school programs in Flint, Saginaw, and Monroe were cited as examples of current best-practice efforts in working with industry. Two examples of developing early awareness programs were the GM Youth Educational System (YES), and Explore the Possibilities Program also located at GM. Finally, a strong, innovative and developing school-to-work effort in Macomb County is receiving much praise from two of the Big Three. This program has a mix of strong business representation with critical input from union skilled trades, and is forging new links between public school counselors and teachers and industry.

- *Elements of success and recommendations*

Respondents listed a series of broad, general elements of success for Big Three automotive skill and education initiatives. These elements of success or best practice also serve as recommendations to responsible program developers. They include the following:

1. *An emphasis on the complete mastery of a core curriculum.*

   Impressively, *the* core curriculum for 11th and 12th grade automotive school-to-work programs has now been selected by at least two of the vehicle firms and a number of suppliers. Indeed, FAMS program (see appendix VI.2) training of

Wayne County teachers will soon commence. It is strongly recommended that all Wayne County school districts become familiar with this program and seek to achieve some near-term interaction or participation. The American auto industry has developed, in recent years, a strong commitment to common industry standards and certification in many areas: quality performance, software, electrical and other engineering tolerances to name a few. Human-resource performance certification is clearly a natural area for common standardization. Any large automotive county that participates early in this process should gain an immense advantage.

2. *A strong awareness and emphasis on applied manufacturing technology—backed by sufficient investment in these technologies.*

   The most advanced programmable automation in world manufacturing today has been deployed in Big Three industrial plants. This technology is now subject to constant change. Students cannot grasp the essential skills needed to work effectively with these technologies unless they are exposed to the actual equipment and processes on some scale in their vocational education. Ways of acquiring these technologies, or sharing them, must be implemented in successful programs.

3. *A committed and motivated faculty—capable of imparting critical behavioral skills to students—partially through personal example.*

   Teachers and instructors are powerful role models, especially for students that may not have access to such leadership elsewhere due to social circumstances. An outstanding faculty capable of developing discipline and an ethic of work commitment in their students, is a key ingredient of any successful education-to-work program. Achievement in this area can only be attained by dedicated instructors who personally exhibit the behaviors employers most desire in new employees.

4. *Meaningful internships with automotive employers as an integral part of the program.*

   The popularity of engineering and technical internship programs at the Big Three is now paramount. The best and the safest hires for these firms are individuals that have been tested "on-the-job" for some length of time. Internships also allow the intern to sample the pace and requirements of automotive work. So far, internships in production are not prevalent in the auto industry. Programs that can make the investment in developing the contacts and providing the resources necessary for company provided internships will be the most successful training initiatives in the industry.

5. *A strong two-way information flow between industry and education regarding the needs of employers and critical industry change.*

   The best programs spend resources—primarily in instructor time—at places of work in the auto industry. Program administrators and instructors must make themselves aware of industry changes in technology, work organization, and the competitive market for automotive products. Forums should be made available to employers that constantly upgrade their information regarding training and education opportunities in Wayne County. These forums should also provide opportunities to employers to give feedback and direct input into the design of industry school-to-work programs. Finally, perhaps nothing can substitute for instructor, teacher, and counselor experience in the field. Summer internships in automotive plants should be made available to education faculty and administrators to ensure the transfer of up-to-date, detailed information on industry change and needs.

6. *Active and equal involvement of the local plant union leadership and membership.*

   No one knows better the requirements and potential of future automotive employment than those who currently perform the work. Perhaps Wayne County's most valuable education resource in the long run are its union locals. It is strongly recommended that Wayne County educators develop a relationship with the most important and active of these labor organizations in and out of the auto industry. Of course, union representatives do participate and are important members of the workforce development boards. These contacts should be used as a resource for effective partnering between individual school districts, or even individual schools, and specific union locals. Typically, any large union local will maintain an education and community-relations committee staffed by representatives who work with local schools as part of their union duties.

IV. Automotive Skill Initiatives: Auto Suppliers Consensus

Methodology

The Office for the Study of Automotive Transportation used a consensus method of research to explore the human-resource challenges and opportunities for Wayne County suppliers. For a detailed description of this process, see section III, Introduction.

The supplier firms were asked to schedule a time to participate in an in-depth personal interview on automotive human resource issues. OSAT requested that the respondents at each firm include the chief executive and the personnel or human resource manager. Six interviews were completed on company sites in the spring of 1996. In five cases, the president or chief executive of the supplier firm was the primary respondent. At two firms, the manager of human resources also participated in the interview. An interview instrument was developed and sent to respondents prior to the interview. The instrument was designed as a guide for the discussion and allowed respondents some time to consider their responses. However, the actual discussions were not limited to items contained in this instrument. The average duration of the supplier firm interviews was about 90 minutes.

The results of these interviews were recorded by the two OSAT researchers present at each of the interviews. These responses, detailed below, have been circulated among the interviewees for content review.

Description of Respondents:

Six Wayne County suppliers were selected to participate in this project. Three suppliers were selected because of their involvement with the Wayne County school-to-work program. The other three were selected to elicit the views of those that were active in training, but not necessarily school-to-work programs. The Wayne County automotive supplier firms interviewed cover a wide range of automotive supplier activities. One firm specializes in remanufacturing parts for original equipment manufacturers and repairing Big Three equipment. This inner city Detroit facility has about 90 employees who can be divided into roughly equal-sized low-skilled, semiskilled, and high-skilled groups.

Two of the firms are located in Livonia. One, a supplier specializing in screw machine products, employs about 75 workers of various skill levels. The second, a manufacturer of specialized spring products, employs 85 semiskilled to high-skilled workers.

Another respondent operates a small metal stamping facility in Highland Park with about 40 employees. The work force is about 40 percent high-skilled, 20 percent semiskilled and 40 percent low-skilled. A Romulus supplier produces brackets and structural parts

for OEMs; it employs about 90 workers of low to moderate skill levels. Finally, the interview of a large national supplier with headquarters in Downriver Wayne County focused on engineering and CAD/CAE skills requirements.

Interview Issues:

The interviews were designed to elicit respondents' views on the state of automotive skills in Wayne County and the role of the county's educational system in increasing those skills. The major areas of discussion as presented by OSAT were as follows:

A. Standards and Needs

- *Required knowledge and the importance of labor quality*
- *Current Wayne County student performance*

B. Linkages and Extensions

- *Current interaction with schools*
- *How should, or could, this interaction be changed*
- *Expectations regarding school-to-work programs*
- *Ideal definition of school-to-work programs*
- *Practical design of school-to-work programs*
- *Barriers to implementation*
- *Company commitments*

C. Patterns of Success

- *Identification of successful existing programs*
- *Elements of success and recommendations*

The results of the six interviews are discussed in the remainder of this report.

A. Standards and Needs:

- *Required knowledge and the importance of labor quality*

Supplier respondents described a wide range of desired skills and knowledge requirements. Many of these skills were specific to individual supplier's core competencies. However, one thread that was woven through all six interviews was the belief that basic academic skills, combined with the ability to apply those skills, was essential to world-class manufacturing. All respondents agreed that, unfortunately, these skills are lacking in Wayne County's applicant pool.

The respondents divided necessary knowledge requirements and skills into four distinct categories: employability skills, traditional academic skills, "workplace of the nineties (and beyond)" skills, and finally, manufacturing knowledge. Interestingly, these skills

appear to be hierarchical. Employability skills were viewed as a building block for the other three types of skills—without basic employability skills, there is little expectation an individual can develop the higher skills. Once employability skills were mastered, traditional academic skills and "workplace of the nineties" skills could be developed. Finally, applicants with the first three skill sets could easily be trained to become effective modern production workers.

a. Employability skills

Wayne County suffers from many of the same ailments evident in the rest of the country. Some have referred to a lost generation of individuals who do not comprehend the most basic requirements for retaining a job. Employability skills were described as the ability to demonstrate good attendance and show up on time, ready to work. Among the more common symptoms for individuals lacking employability skills are frequent tardiness, inability to read, write, and calculate; and drug or alcohol use. These individuals do not have the discipline or desire to be effective employees in a manufacturing environment. One respondent indicated that a working parent or role model often was the best indicator of an applicant's sense of responsibility. Unfortunately, most respondents see employment-skills-deficient individuals as an increasing proportion of the county's workforce.

b. Traditional academic skills

Respondents placed a great deal of emphasis on basic academic skills. One respondent likened education to a toolbox. In school, students acquire skills, or tools, to fill their toolboxes. Upon entering the working world, they then use these tools to excel in their chosen fields. All respondents were greatly concerned that the current K-12 system and the colleges and universities of Wayne County were not capable of graduating individuals with the necessary skills to compete in manufacturing. Some respondents felt that the students were not only lacking the basic academic tools, but, because of a lack of more fundamental employability skills, many may never acquire them.

The respondents stated that, ideally, they would like to find applicants with a high-school (or equivalent) education in math, reading, and writing skills. However, all suppliers interviewed are experiencing difficulty finding a sufficient number of workers who meet this requirement. The suppliers' comments make it apparent that a high-school diploma no longer guarantees that an applicant has mastered even the most rudimentary academic skills.

In recent years, the need for math in manufacturing settings has greatly increased. Yet a majority of manufacturing jobs still require only the most fundamental of math skills. The activities for which respondent businesses require workers to utilize math skills include using measuring devices, making quality checks for processes requiring averages and ranges, setting production standards, and examining and improving efficiency. These activities require a high degree of competency in a basic set of math

abilities. The skills identified as necessary are: addition, subtraction, multiplication, division, and the ability to work with fractions and decimals. One respondent indicated that trigonometry skills are not required, but that accuracy in basic math calculations is vital.

Respondents emphasized the necessity of reading and writing skills. Manufacturing activities which require reading include reading a parts book, heeding safety warnings, and following operating and maintenance instructions for equipment. Writing skills are needed to fill out forms indicating labor and parts requirements for specific jobs. Several respondents experienced misused or damaged equipment due to workers' inabilities to read instructions.

c. "Workplace of the nineties (and beyond)" or modern workplace skills

No longer can automotive companies rely on their labor for brawn alone. If companies are to be internationally competitive, they must not only *ask* their production employees to think, but *require* them to do so.

Increasingly, companies are moving to team-oriented production concepts. All respondents put a strong emphasis on the ability to work in diverse, self-guided teams. As more women and minorities enter the automotive production industry, it is increasingly essential for employees to understand the differences between individuals and treat these differences with sensitivity.

Several interview participants stated that the current educational system does not adequately prepare students with the communication skills required by industry. Communication skills are important not only for verbally contributing ideas to a workgroup but also for expressing ideas and information in written form. A high-school education may no longer be sufficient to effectively express ideas and concerns in the modern manufacturing setting. One respondent who aggressively pursues a team approach requires team meetings with written minutes, agendas and action plans. Although this company has had difficulty finding employees who are capable of these tasks, they have bridged the skills gap with internal training.

Problem-solving skills are also becoming increasingly important. Not only must workers identify problems, they must be able to analyze the situation and properly take appropriate action. Companies seek individuals that not only are able to perform a task, but are also able to understand the task performed.

Respondents placed a high value on an employee's ability to learn and therefore be trained. Manufacturing technology is rapidly evolving, and the life span of a given production technology will continue to decrease. Therefore the most valuable employees may be those that are sufficiently skilled in the art of learning and can actually train themselves.

Finally, there was some discussion about the need for multilingual employees. At least one supplier interviewed had a significant proportion of employees who spoke English as a second language. Although the need for multilingual production workers may be somewhat unique to that facility, there is also agreement that engineers, managers and even skilled trades must become more aware of the international environment in which this industry operates. An important part of that awareness is the ability to communicate in native languages.

d. Manufacturing knowledge

There are nearly 350 independent supplier facilities in Wayne County. These companies produce a wide range of products. Therefore, it is only natural that the skills requirements of this group vary drastically. This diversity is an important point for any automotive production skills initiatives program. With few exceptions, suppliers are too small to warrant skills initiatives programs tailored to their manufacturing needs. Most respondents suggested that, from a supplier's perspective, the critical element for a school-to-work program is to instill basic manufacturing knowledge in the students. If such skills were supplied by the educational system, the supplier could easily train new hires for specific manufacturing needs. Several suppliers expressed concern that external training such as school-to-work be general enough to give workers skills that are transferable to different tasks and potentially different jobs. One respondent stressed the need for skill training that not only transfers from job to job but also career to career, since many people will change jobs several times in their lives.

However, some suppliers who require higher skilled employees felt that a school-to-work program could provide highly specific skills. These respondents said that the high wages of skilled jobs would justify the increased cost of a more specific education program. These suppliers also felt that students trained with very for specific high skilled jobs would be less likely to change careers.

- *Current Wayne County student performance*

Respondents reported a very low satisfaction level with the current educational system. It is important to note that all suppliers interviewed—regardless of wage rate, skills needs, or location—were extremely dissatisfied with the performance of the educational system.

Respondents said they were experiencing difficulty in finding applicants who met their traditional academic-skills requirements. One firm indicated a 45 percent failure rate on its screening test for basic math skills. Several firms indicated that a major proportion of applicants did not possess the reading and writing skills needed to correctly fill out an application for employment. Tragically, according to the suppliers interviewed, the frequency of academically deficient high-school graduates is increasing.

Respondents expressed the need for greater emphasis on application of academic material. They felt that current curriculums were too theoretical and did not prepare students to use their academic skills in the work place. Of special note are the comments of one respondent regarding engineering skills. This supplier had a practice of hiring recent graduates who had participated in educational co-op programs. This practice benefited the company in two ways. First, it assured them that the new hire had applied skills, and, second, it allowed the company to evaluate the employee's work habits.

Respondents offered several explanations for deficiencies in traditional academic skills. First, there is a feeling that current high school curriculum is geared toward the college-bound student. Several respondents suggested that those responsible for the direction of the K-12 system must realize that not all students are interested in an educational track that includes college. In the current system, many talented students may be lost because they do not fit the college-bound profile. Without the opportunity to explore choices, students are often unaware of their career options. They lack insight into what skills are required to succeed in various occupations. Motivation problems among students and workers were partially attributed to entering the work force without sufficient career information. Another obstacle is the theoretical nature of academic course work. Courses often fail to examine real world applications of the material. As a result, students do not envision the benefits of learning, and have less incentive to adopt good learning skills.

Respondents attributed deficiencies in employability skills to two primary causes. Employability problems were most frequently attributed to a lack of discipline. Many references were made to the educational systems' inabilities to discipline students. This, in turn, creates a false expectation of what is acceptable in the work force. The higher incidence of single parent families and parents working more hours was also blamed for decreasing parental influence on the level of discipline instilled in young people.

The respondents attributed a lack of problem-solving skills to course work that focused on answers rather than methods of solving problems. A lack of team skills was attributed to the traditional emphasis on individual achievement in school and other settings.

Finally, traditional vocational education is perceived by some as a place to keep problem students occupied as they pass through the educational system. Many also felt that this led to less incentive by a school system to upgrade vocational education equipment.

The respondents indicated a need to reassess adult training and retraining. A large portion of the suppliers' production applicant pool is non-high school graduates or older adults. Programs designed for these individuals could assist in training displaced workers to give them skills that are in high demand by industry. Respondents spoke of one- or two-semester courses in basic math, reading, and writing combined with a class

providing basic manufacturing skills as adequate to place a worker in a job with the potential for skill advancement.

The current work-related education and trainingal system was identified as giving poor incentives. In many cases, it is only free to those who do not have a job. This penalizes those who are working. An alternative proposed by one respondent was to bring teachers to the work site to teach employees. Employees would be paid for the class time by the employer, who would benefit from the increased knowledge level of the work force. The county and school districts were proposed as partners lending support to the initiative by providing the teaching staff. The supplier and the instructor could cooperate to develop an appropriate curriculum.

One supplier had a policy to reimburse workers for the cost of classes they complete. This supplier noted that a major barrier to workers electing classes is the time constraint created by working full time, traveling to and from school, and studying. These real-world constraints often made it difficult for many of the company's employees to participate in the reimbursement program.

All interview participants take an active role in their employees' development. Many references were made about higher productivity and lower supervision requirements resulting from a capable work force. All interviewees mentioned both formal or informal programs for increasing employee skill levels and rewarding motivated employees with more responsibility and higher-skilled, higher-paying jobs.

B. Linkages and Extensions:

- *Current interaction with the schools*

All six suppliers interviewed have in the past or currently are working to develop linkages with local school systems. The respondents report mixed results with these programs. Several respondents introduced OSAT researchers to highly successful employees who had been placed through contact with the local school systems. Unfortunately, these success stories appear to be rare.

Respondents currently active in school-to-work programs see potential for positively affecting the lives of those students who are not college bound. An important note is that all of the respondents perceived involvement in school-to-work as a competitive advantage. By being active in the program, they may be better able to influence the educational system to meet the needs of the company. One respondent also said that the visibility gained by being active may increase awareness of the company among students.

Three of the six respondents are members of the Wayne County School-To-Work Executive Board. These individuals were well versed in the current status of the

Workforce Development Board and the resulting changes to school-to-work funding policies. However, it is important to note that relatively few in business are as well informed. It is also important to note that even with all their activities, the three executive board members reported some resistance from local school districts. Although the Wayne County School-To-Work Partnership has made significant progress, there is still much to do.

The linkage between industry and the educational system must be strengthened. All too often, each side appears to be placing blame on the other. Teachers and administrators must become more aware of industry in general, and the supplier industry in particular. Conversely, there are many in industry that appear uninterested in assisting the educational system.

- *Expectations and definitions of school-to-work programs*

Ensuring that each graduate has the ability to make a living was identified as the overriding goal of any school-to-work initiative. As noted earlier, the supplier respondents strongly believe that school-to-work programs should not limit the student to a narrow career track. Especially in the earlier grades, it is essential that school-to-work act as an incentive to let students explore a wide variety of interests and choices. They suggest school-to-work should be viewed as a way to communicate career options and the rewards that accompany skills training to young people.

The Wayne County school-to-work strategic model describes four levels of a successful program. The first level is designed to give elementary students an awareness and basic understanding of the free enterprise system, and the wide array of career choices. The second level is explorative in nature. Students should be given the encouragement and opportunity to explore various career tracks to experience the various working environments. The third level, the early high-school years, begins to focus the students on future careers by offering a curriculum that highlights the skills needed for future employment in a chosen field. An important element of this stage is the inclusion of multiple exit points. Finally, the late high-school and post secondary education includes application of learned academic knowledge, and experience in a working environment.

Goal setting and career awareness programs were mentioned as means of helping students develop a focus that would sustain the motivation to learn. Career exploration is an important part of preparing students for the challenges they will face after high school. Realistic information about the rewards of different occupations in terms of personal fulfillment and financial gain should be communicated. This could help students make intelligent choices about their future by exploring their interests. Career exploration could also help them understand how class assignments apply to the work place. Respondents emphasized that career awareness would increase students' motivation because it could help them see the payoff for working hard, or the consequences of a lack of effort.

The respondents stated that there are skills that are essential to all students. Whether college-bound or entering the work force directly from high school, a mastery of reading, writing, and mathematics was viewed as invaluable. Although respondents agreed that these were traditional academic skills and should be taught in the current system, many felt that the applied nature of a school-to-work program could help spark the interest of students.

Respondents indicated that social and economic factors may play a part in both academic and non-academic skills deficiencies. Single and working parents have less influence on a child's development because of the decreased amount of time available to spend with the child. Poverty deprives many young people of role models who can provide a vision of career success. Respondents acknowledged that these problems were more properly addressed by society than by a school-to-work program. As at least one respondent suggested, the deficiencies in the current applicant pool are a reflection of society's ills, and school-to-work alone can not change society.

- *Practical design of school-to-work programs*

Because of the vast differences among suppliers, the school-to-work at the automotive supplier level is less focused than at the Big Three. The supplier respondents gave several designs for school-to-work programs ranging from a fundamental redesign of vocational education programs to charter schools focusing on automotive skills.

The supplier respondents appear to have very different expectations for school-to-work than do the Big Three. This may be due in large part to the differences in wages offered by the two groups. Given recent experience, it may also reflect the suppliers' jaded view of the educational system. For whatever reasons, supplier respondents felt that, at its most basic level, school-to-work should be focused on providing the fundamentals of the four aforementioned distinct skills categories. If a program can deliver students with employability skills, basic academic skills, modern workplace skills, and a fundamental understanding of manufacturing, the suppliers would view it as a success.

Some respondents believed that their needs could be met by a revision of vocational education. There was a feeling that vocational education is out of date. Old equipment in the school programs is not preparing students for the workplace. One respondent indicated that new equipment is not necessary but suggested for example, that computer numeric-control units could be fitted to old machinery. This would teach students to work with the electronic control units found in manufacturing settings without a huge equipment cost to schools. These respondents want vocational education programs to incorporate materials that would raise student awareness about manufacturing and the career potential that exists.

There was also an interest in vocational education initiatives in which students would learn about manufacturing industries. Both counselors and vocational education teachers could be instrumental in building awareness of the opportunities that exist.

However, many vocational education teachers are not up to date on current industry practices. Several respondents said that effort must be made to update the skills of these teachers. One supplier suggested the use of recent industry retirees as a means to fill in the gap between the current vocational education teachers and industry. As has been noted, the automotive industry has experienced significant attrition due mainly to retirement. These recent retirees represent a vast knowledge resource that could be an exceptional asset for the county if properly leveraged.

However, one respondent, representing a firm with higher skill requirements, said that the school-to-work initiatives could and should be capable of producing students who were qualified to enter the workforce as apprentice skilled machine operators. This respondent defined a much more in-depth program with students spending one half of the school day in the classroom and the other half at the supplier's facility. For such a program to be successful, substantial effort would be needed to coordinate useful standards and skills. These standards could be based on those set by professional associations, or they could use existing programs such as the Ford Academy of Manufacturing Arts and Science (FAMS) as a standard. The latter may be especially attractive, since at least two of the Big Three have committed in principle to this material.

- *Barriers to implementation*

a. Structural barriers

Respondents identified two types of structural barriers. First, any effective school-to-work program must overcome the County's diverse educational system and its long-standing political infighting. Second, the wide chasm between the educational system and much of business must be closed.

Several respondents discussed the challenge of coordinating Wayne County's 33 school districts. Wayne County's diversity among school districts has potential to be a boon or a bane. The web of relationships between these districts presents a significant challenge for the efficient development of school-to-work. Each district has established programs—some successful, others not. If workforce development boards attempt to allocate funding on criteria other than the traditional methods, the changes will likely not be well received by many. One respondent pointed to an example of the political atmosphere by describing an excellent manufacturing program that was shared between several districts, yet other districts that were logical participants were excluded because of long-standing political differences.

The respondents also were quick to point out the positive side of Wayne County's diverse group of school districts. There are currently many excellent school-to-work programs. The County and its workforce boards could use the best programs within the County as models and distribute the curriculums to the other districts. Several participants felt that Wayne County could best be served by promoting centers of

education excellence. Programs that have already established excellence in given field could serve the entire County. Students county wide would be eligible to enroll in the program. One drawback to this suggestion was the travel requirements placed on students. Not all students have access to personal transportation, and the current mass transit system may not be adequate to get students between districts in a timely manner.

Communication barriers between business and education were mentioned as a major problem. Respondents felt that the educational system was not aware of business skill requirements. Businesses were also frustrated by perceived misconceptions among students about the nature of manufacturing work.

Over the course of the interview process, many ideas for improving communication between business and education were generated. Teacher internships in manufacturing facilities was one proposal for facilitating communication between business and education.[11] Teachers would spend a couple of weeks at a plant during the summer. They would develop a sense of what skills the business requires. They could see how academic skills are applied in the work place and incorporate examples into their teaching lessons. The instructors could also become more aware of career options available to those who are not college-bound, and be better able to advise those students.

b. Social barriers

Some respondents believe manufacturing work suffers from a poor image. They believe manufacturing jobs are stigmatized as dirty, menial, low-tech and low-paying jobs. They suggest that the lack of qualified applicants stems from the fact that students are either steered to a college track in high school or look at service sector jobs after high school. All participants stated that the educational system must become more informed of the opportunities in manufacturing.

Respondents indicated that, as the nature of manufacturing has changed, so have manufacturing jobs. They emphasized that even small facilities now use high-tech, computer-controlled machines. Employees are working in teams and being empowered to make decisions that were formerly made by supervisors. Factories have become cleaner, more pleasant places to work. Wages rise along with skill levels, and there are many high-paying jobs available to skilled workers.

Many of the interview participants believe this problem can be overcome with better communication. They think that if given proper information, people will want to work in the new manufacturing environment. It was suggested that school counselors and vocational education teachers could best spread the message about manufacturing jobs

[11] The Wayne County School-to-Work partnership funded a two week teacher internship during the summer of 1996. The intern program was a joint effort between the Downriver Community Conference, Henry Ford Community College Tech-Prep Program, and Employment & Training Designs, Inc. and included nearly 130 out-Wayne County teachers.

to students. Several pointed to the earning power of their skilled workers as a powerful motivational tool to attract talent if this benefit is communicated to potential applicants. Respondents felt that individual firms could not have a great effect on the perception of manufacturing jobs. Public or community institutions were perceived as being better equipped to disperse this information. The target of this marketing effort would be both high school students and adults seeking advancement.

C. Patterns of Success:

- *Identification of successful existing programs*

Respondents indicated several characteristics of a good school-to-work program. A program for building awareness of career options is considered instrumental. Kalamazoo schools were mentioned as a good model for building student awareness. This program has been studied by several Wayne County school-to-work participants.

Strict discipline is considered a must. Several references were made to Focus-HOPE's three-tardiness expulsion rule. It is considered important to reinforce the idea that these high-skill, high-paying jobs require people who are responsible and have a strong work ethic.

Listed below are several programs identified by the respondents as successful models:

1. K-12
    a. Romulus (good co-op)
    b. Kalamazoo(good career awareness programs)
    c. Jackson
    d. Ford Academy of Manufacturing Arts and Sciences

2. Pre-employment programs
    a. Breithaupt Center
    b. Focus-HOPE
    c. Metzger (school for slow learners)

3. Innovative ideas
    a. Job Shadowing
    b. Career Mentoring
    c. Teacher Internships (in the workplace)
    d. Student Internships
    e. Career Pathways/Exposure

4. Community Colleges
    a. Schoolcraft Community College
    b. Henry Ford Community College
    c. Wayne Community College
    d. Washtenaw Community College
    e. Macomb Community College

- *Elements of success and recommendations.*

Several overriding themes arose over the course of the interviews. There is much concern relative to the ability of the new workforce entrants, as well as the current employees, to be trained. Respondents expressed a desire for higher skill levels in both non traditional and traditional academic skills. Teaching students how to learn is considered more important than teaching specific material. Respondents listed a series of broad, general elements of success for automotive supplier skill and education initiatives. These elements of success or best practice also serve as recommendations to responsible program developers. They include the following:

1. *Increased communication, both formal and informal, between industry and education.*

    Communication between industry and education must be formalized. The industry must better communicate to educators the skills required for the autoworker of the future, and work with the educational system to develop programs to meet these requirements. Conversely, the educational system must become more willing to change. The status quo in education will not likely meet the future needs of the automotive industry. In any business, a basic understanding of the customers' needs and requirements is instrumental in developing a successful product. The results of the supplier interviews suggest that, in the case of education, there has been very little productive communication between industry, which is the customer, and the schools, which are the suppliers.

    It is important that automotive industry participants and educators communicate the realities facing each other. Communication between industry and the educational system should be at a minimum of two levels. First, the industry must have a presence at the intermediate school district level. Suppliers should be willing to work with administrators to inform them of industry trends and future needs. Second, there should be a strong link between industry participants and teachers and counselors; in other words, suppliers need contact with those individuals who make decisions on curriculum and those who directly influence students.

2. *Emphasis on mastery and application of core curriculum skills.*

Mastery of the core curriculum of reading, writing, and mathematics must be re-emphasized. Too many students are graduating without the core skills. Suppliers expressed a belief that incentives would help students achieve competency in core subjects. They felt that communication between industry and educators would enable educators to demonstrate to students the specific skills needed in the workplace and assist the educators in the development of an application-oriented curriculum. If the core curriculum were more applied and less theoretical, students may better be better motivated to learn

3. *Increased manufacturing awareness among those teaching core curriculum and manufacturing curriculum courses.*

Educators with an increased manufacturing awareness could more accurately inform students of the nature of work, the financial rewards and personal fulfillment associated with careers in the automotive industry. Suppliers feel that it is critical to be able to effectively inform students of the benefits available from manufacturing careers. Several methods of transferring information were suggested by respondents. High-school teacher and counselor internships were unanimously endorsed. Such programs would help educators to better understand manufacturing. On-site training programs as part of a continuing education strategy would also provide similar exposure for teachers. Another suggestion involved Wayne County developing a forum where educators and manufacturers would gather periodically to share information.

4. *A strong commitment to emphasize and update a manufacturing technology curriculum.*

An emphasis on manufacturing technology is important. Suppliers want students to gain exposure to manufacturing equipment and processes so that they will understand how skills are applied in the work place. Suppliers desired more general manufacturing skills than the Big Three and expressed a willingness to undertake some training internally. However, exposure to electronically controlled equipment, process controls, safety issues, and problem analysis are considered critical. Also considered critical is the introduction of students to quality programs. Industry currently spends a large sum of resources, both financial and time, to train employees on various quality standards. The educational system should provide the fundamental skills for these programs.

5. *A strong interaction with industry to develop school-to-work programs.*

Because of the vast differences among automotive suppliers, the ideal school-to-work program at the automotive supplier level is less focused than at the Big Three. Therefore it is essential to enlist a wide variety of suppliers in the development of any such program. Some respondents believe their needs could be met by a revised vocational educational system. Dispersion of model programs curriculum among schools and standardized skill certification were desired revisions. For supplier firms requiring a higher skill level, a curriculum based on Ford's FAMS program may be satisfactory.

6. *Manufacturing experience through student internships.*

Without exception, respondents indicated that experience is a valuable part of the learning process. Student internships were cited as a way to give students maximum exposure to careers in manufacturing. Currently student internships are fairly uncommon. Policy to formalize the internship placement is needed. A model program should be chosen and distributed among the schools. The program should address funding requirements, and problems associated with student transportation to and from manufacturing facilities. Issues of safety and liability are of concern to the manufacturers, educators, and Wayne County.

7. *Adult training that focuses on skill development for the unemployed and updating skills for those currently employed.*

Although adult training was not directly addressed in this report, it is an essential piece in the supplier human-resource puzzle. Many of the new hires for automotive suppliers are not recent high-school graduates, but instead are drawn form the County's active labor pool. It is essential that Wayne County work with its community colleges, universities, and other work-related education and training stakeholders to develop programs that parallel the school-to-work effort. In the future, work-related education and training will need to serve two very separate functions. First, it will need to give the basic fundamental skills to the unemployed and underemployed. Suppliers believe the current Wayne County applicant pool lacks qualified individuals for even the more basic production occupations. Adult training must effectively raise the overall skill level of the County's employment pool. Second, the pace of change in industry is phenomenal. In the coming years, employees will need continuing education at an increasing rate. If Wayne County is to keep automotive supplier jobs, both production and technical, the county must proactively work to assist industry in updating the residents' skills level.

Because continuing education is becoming so critical, there is strong support for on-site training and education programs. Many suppliers are willing to work with the educational system to develop training and education modules that can be taught at the production facility. Such a program may be an excellent companion to teacher internships.

V. Benchmarking Wayne County's Automotive Business Climate

A. The Survey Process

Purposes

The Wayne County Automotive Business Climate Survey was intended to accomplish three objectives. First, the survey was to measure current attitudes toward local business climate conditions held by significant respondents at Wayne County automotive facilities. The survey was also designed to identify from Wayne County automotive respondents which business climate areas the County should best focus on. In other words, in the view of its automotive business clients, which areas of the County's business climate should the County government work hardest to improve? Finally, the survey was meant to provide a first, informed step in the development of an economic development instrument to collect specific information regarding Wayne County's business climate and policy performance in the eyes of its major automotive customers.

The survey questionnaire and process are expected to change in the future based on this first experience. Even so, future responses from Wayne County automotive respondents can now be compared to results collected in this survey in order to measure progress or changing attitudes. The critical objective of this information effort is to collect feedback on strategic issues from Wayne County's automotive industry for a county with a strong interest in successful change.

Questionnaire Development

The survey questionnaire was based heavily on the focus-group consensus results of an earlier research study, *Michigan: Still the Automotive State?*, performed by OSAT for the Michigan State Department of Commerce in 1992.[12] That study sought to identify the public economic policies of greatest influence in site location decisions made by automotive firms. Nine major policy areas were identified by the 45 automotive staff and executives who participated in the study. Considerable detail was provided by respondents regarding the most critical issues in each policy area, as well as Michigan's performance relative to other large automotive states. The initial questionnaire draft was produced in November 1995.

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[12]Sean P. McAlinden, and David J. Andrea, ***Michigan: Still the Automotive State?*** Office for the Study of Automotive Transportation, Transportation Research Institute, The University of Michigan-Ann Arbor, UMTRI-92-42.

The final mail questionnaire is reproduced in appendix VI.3. Section I of the questionnaire asked for company/facility background information. The background questions asked respondents to detail years at current site, primary facility activity, total employment and future intentions on employment levels over the next two years.

Section II is the largest section of the overall questionnaire. In this section, respondents were asked to assess current business climate conditions related to their location in Wayne County. Nine major climate areas were listed. Respondents were asked to rate each major climate area on a scale of one to five, where one is "excellent" and five is "poor." In addition, respondents were asked to check the most critical issues in each policy area from a list, or to identify additional critical issues in an open-ended space for comments.

Finally, section III of the questionnaire asked respondents to prioritize the nine policy/business climate areas in terms of where they believe Wayne County should best focus its efforts. The respondents were asked to assign each climate area with a priority number, one through nine, where one has the highest priority and nine the least priority.

Survey Sample

The population sampling frame for the survey was created especially for this study. A list of 411 Wayne County automotive facilities or employment sites were identified and listed in the Wayne County automotive endowment directory. This list contains names, titles, and addresses of current contacts and employment totals for at least 17 identified types of automotive facilities located within Wayne County. The population list was drawn from a variety of public and OSAT sources.[13] A full count and description of the population frame used in survey sampling is provided in table V.1. Table V.1, however, provides a summary of the population frame broken out by the four major sampling categories used in this survey. The major categories—Big Three facilities, independent auto parts manufacturing facilities, tool and die and prototype shops, and independent engineering service and research and development facilities—were preselected by OSAT as the four major functional sectors of Wayne County's overall automotive industry.

[13] The sources included the American Automobile Manufacturer's Association's (AAMA) *Handbook on US Motor Vehicle Manufacturers' North American Plant Facilities*, Elm International's *The Elm Guide to Automakers in North America*, Harris Publications' *Michigan Industrial Directory*, and additional records taken from OSATBASE, the conference and research automotive directory maintained at OSAT.

TABLE V.1
SURVEY TOTAL POPULATION FRAME BY FACILITY TYPE

Firm Type	Number	Count %	Empl.	Empl.%
Big Three	63	15.3	93,593	77.0
Auto Parts	105	25.5	20,789	17.1
Tool & Die	220	53.4	6,081	5.0
Engineering Service	24	5.8	1,027	.8
Total	412	100.0	121,490	100.0

As table V.1 shows, although the Big Three constitute only 15 percent of total automotive facilities in Wayne County, the Big Three are responsible for 77 percent of total automotive employment. Tool and die and prototyping firms, on the other hand, constitute over 50 percent of total automotive facilities, but only 5 percent of total employment. Only 24 independent engineering service or research and development facilities are listed in the endowment directory.

In constructing the survey sample, it was decided to strike a balance between each category's importance in terms of its share of the total facility count and share of employment. As a result, about half of the Big Three facilities were randomly selected for the survey. Somewhat more than half of the independent auto parts facilities were pulled, and only about one-third of the tool and die shops were selected. Further, due to the critical importance of the engineering-services sector, these facilities were sampled at 100 percent. As shown in table V.2, a total of 186 facilities were randomly selected for the final survey sample.

TABLE V.2
SURVEY SAMPLE BY FACILITY TYPE

Firm Type	Number	Count %
Big Three	29	15.6
Auto Parts	66	35.5
Tool & Die	67	36.0
Engineering Service	24	12.9
Total	186	100.0

Data Collection

The survey questionnaire was mailed to the initial sample of 186 contacts in December 1995. Some limited follow-up activity was carried out by phone and fax during January and February of 1996 to elicit further response. The data collection effort ended in the first week of March 1996. In all, 44 complete facility surveys were returned to OSAT.

Survey Response

The 44 completed surveys represent an overall response rate of 23.7 percent. This relatively low rate of response could have been due to a number of factors. First, the survey questionnaire was mailed at the end of December, a traditionally low response

period for business surveys, especially in the auto industry. Second, the auto industry is currently thought to be in a state of considerable change, especially in terms of personnel assignments. Many listed contacts may have left their positions for jobs elsewhere, in or out of their original companies.

Despite the low response rate, the distribution of final respondents by firm type closely matches the original distribution of employment across the total population of facilities. The 44 respondents reported a total employment of 17,851. Table V.3 shows this breakout for the overall count of 44 final respondents.

TABLE V.3
SURVEY RESPONSE BY FACILITY TYPE

Firm Type	Number	Count %	Empl.	Empl.%
Big Three	5	11.4	12,370	69.3
Auto Parts	19	43.1	3,667	20.5
Tool & Die	10	22.7	1,386	7.8
Engineering Service	10	22.7	428	2.4
Total	44	100.0	17,851	100.0

B. Survey Results

Three sets of basic results are tabulated from the Automotive Business Climate Survey. Section I of the questionnaire asked respondents to list total employment at their facilities, each facility's primary automotive activity, and the number of years each firm has operated at its current location. Respondents were also asked for their expectations regarding future employment at their facilities. Results for section II include both the ratings on the nine major business climate areas and respondent evaluations of the most critical issues in each area. Results are then described for section III, the questionnaire section that asked respondents to prioritize the nine major business climate areas in order of policy importance for Wayne County. Generally, results for the questions in section II and III receive further analysis in terms of breakouts between large and small facilities, between auto parts makers and toolmaking/engineering facilities, and between firms that are expanding employment and those that are not.

Section I: Company/Facility Background

The average employment of a facility that responded to the Automotive Business Climate Survey was 406 employees. The average respondent has been operating at their current location for almost 23 years. Exactly 50 percent of the respondents (22) reported that they expect their Wayne County facility to expand employment over the next two years. Nineteen of the respondents reported that they expect their employment to be maintained, and only three of the facilities expect employment to decline over the period. However, as shown in table V.4, the overall background varied greatly by type of firm.

Only five facilities of the vehicle-producing firms responded to the survey. The average employment for these facilities was almost 2,500, and only one of these facilities expected to increase employment over the next two years. These very large facilities average 38 years at their current location.

TABLE V.4
RESPONDENT BACKGROUND CHARACTERISTICS

	Expand	Maintain/ Decline	Total
Vehicle Producers	1	4	5
Average Employment	1,200	2,972.5	2,474
Average Years at Facility	13	44.3	38
Parts Producers	10	6	16
Average Employment	185.6	223.5	199.8
Average Years at Facility	13.4	33.3	20.8
Tooling & Engineering	11	12	23
Average Employment	123.6	77	99.3
Average Years at Facility	28.9	13.6	20.9
Total Sample	22	22	44
Average Employment	200.7	610.7	405.7
Average Years at Facility	21.1	24.6	22.8

Background results are shown for two other types of firms in table V.4. The 16 respondents that produce auto parts averaged about 200 for total employment and 21 years at their current location. Ten (63 percent) of these firms expect their employment to increase over the next two years. The 23 respondents who produce tooling, prototypes or engineering services averaged about 100 in total employment and 21 years at their current Wayne County locations. About half (11) of these respondents expect their employment to expand over the next two years. The information collected on background employment, primary activity and employment expectations allows for some analysis of the ratings described below.

Section II: Rating Wayne County's Business Climate

Questions 1 through 9 of section II asked respondents to rate on a five-point scale the 1995 performance of nine major areas of Wayne County's business climate for automotive facilities. The average rating for the nine areas was 3.18, where one is "excellent" and five is "poor." The results in chart V.1 are based on responses to questions 1-9 in section II of the questionnaire, for the full sample of 44 respondents. The best average rating for an individual category was that for freight transportation (rating = 2.68). The next two highest ratings for climate areas were a tie (rating = 3.0) for environmental laws and utility costs. The worst average rating was that for subsidies (rating = 3.67). The next two worst climate areas were public safety/legal climate (3.43) and performance of public education (3.38). Average ratings for the other climate areas are not significantly different from the overall average of 3.18.

Three comparative sets of ratings were computed. Chart V.2 shows the average ratings by climate area of large facilities (employment > 99) versus those for small facilities (employment <100). Overall, the average rating for large facilities, (3.19) was almost the same as for small facilities (3.16). There were few differences between these two firms by specific climate area. Large firms seemed to be somewhat more pleased with local labor quality and freight transportation than were small firms, and small firms were somewhat happier about the climate regarding environmental laws.

CHART V.1
BEST TO WORST: BUSINESS CLIMATE RATINGS
FULL SAMPLE

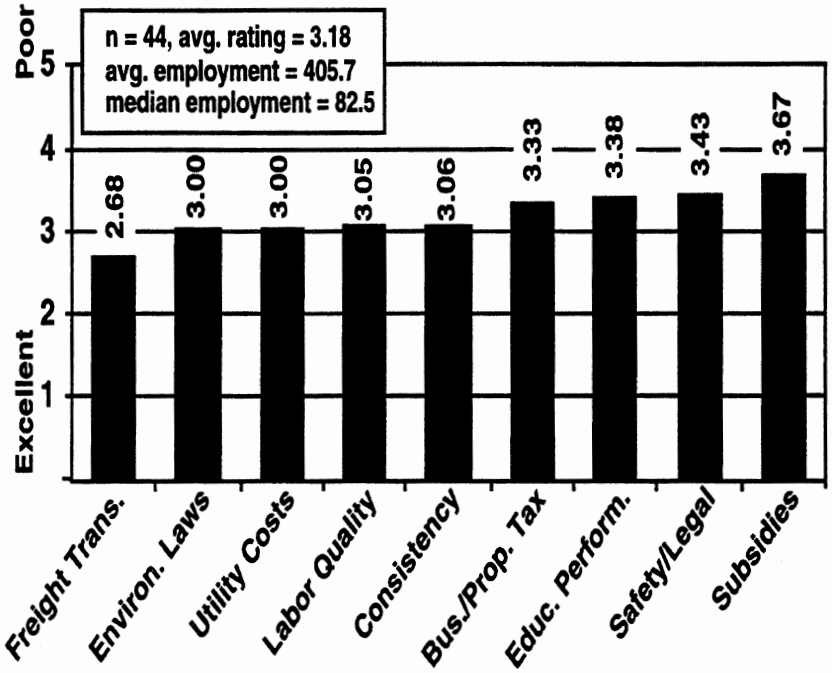


CHART V.2
BIG VS. SMALL FACILITIES:
BUSINESS CLIMATE RATINGS

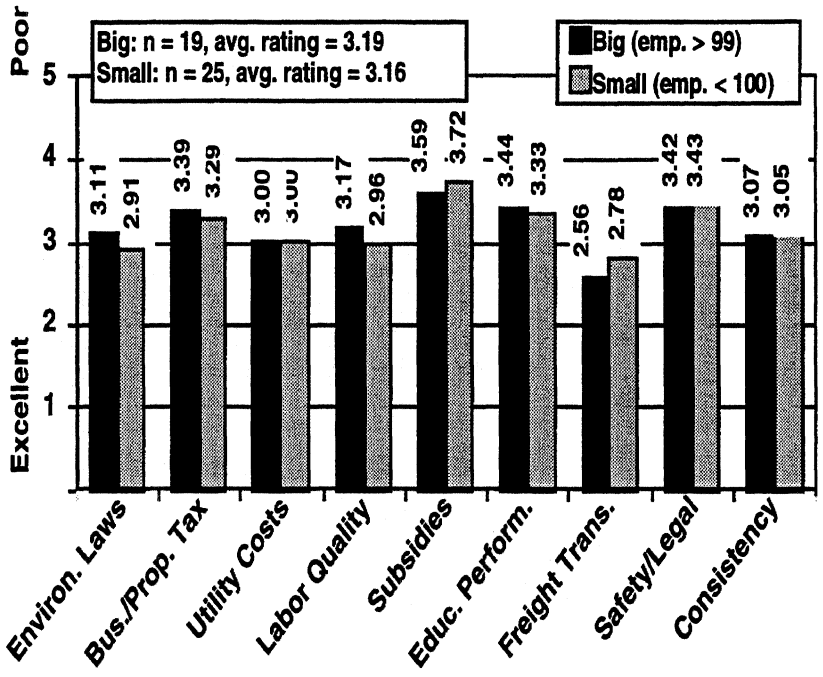
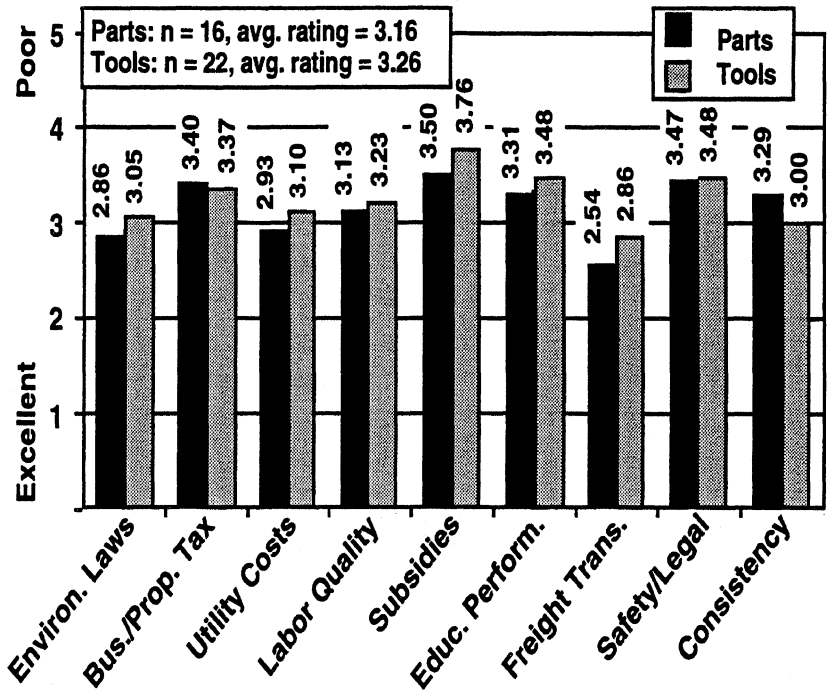


Chart V.3 shows the average ratings, by climate area, of auto parts respondents versus toolmaking and engineering facilities. The five respondents from vehicle producing firms are excluded from this table. Once again, there was not a significant difference between the two types of respondents in terms of the average overall rating (3.16 for parts respondents and 3.26 for toolmaking/engineering facilities). Parts makers did seem to be somewhat more pleased with environmental laws, utility costs and subsidies. Toolmakers and engineering firms, on the other hand, rated the climate in policy consistency more highly than did auto partsmakers. However, neither type of firm was happy with the subsidy climate. This especially noticeable when compared to the excluded automakers ratings of the subsidy climate.

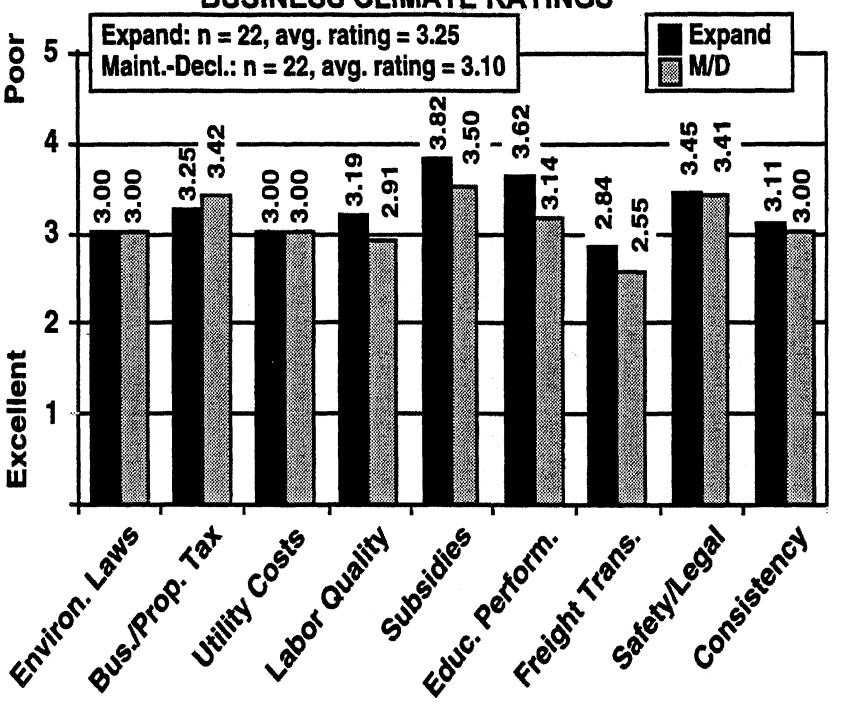
Chart V.4 shows the average ratings, by climate area, of respondents who expected their employment in Wayne County to rise over the next two years versus those who expected their employment to be maintained or to decline. Although there is not a significant difference between the two types of respondents in terms of the average overall rating (3.25 for expanders versus 3.10 for maintain/decline facilities), it may appear surprising that expanding facilities are even marginally less happy than facilities that do not expect their employment to increase. However, this result is not unknown in the literature on economic development. For example, work on firm location decisions in Michigan performed by Lansing and Mueller in the 1960s[14] produced similar results. Firms more likely to remain or even expand in a location are also more likely to complain about local business climate. The incentive to complain and thus receive attention is much greater for such firms than it is for those who feel they might leave. This could also explain why, in this study, respondents who expect to expand employment are less happy than non-expanders about the climate for labor quality, the performance for public education, and subsidies.

CHART V.3
PARTS VS. TOOLS:
BUSINESS CLIMATE RATINGS



[14] John B. Lansing and Eva Mueller, The Geographic Mobility of Labor, Survey Research Center, University of Michigan, Ann Arbor, Michigan 1967.

CHART V.4
EXPAND VS. MAINTAIN-DECLINE:
BUSINESS CLIMATE RATINGS



Critical Issues

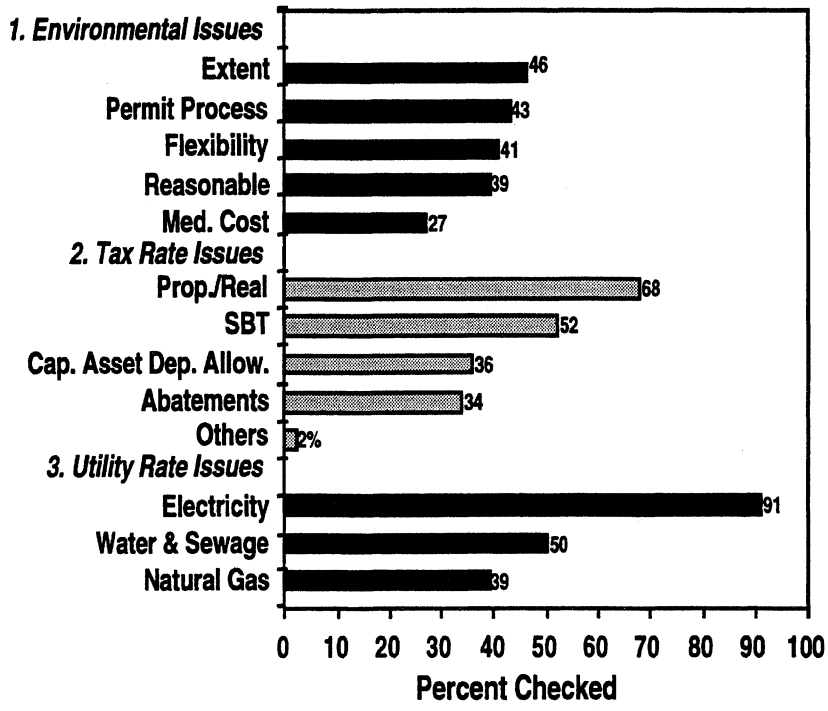
Respondents were asked to check the most critical issues for their facility in each business area listed in section II. Critical" refers to the specific business climate issue's importance in terms of competitiveness. A good rating on a critical issue would be a powerful positive. The reverse is true. However, we did not rank the criticality of Wayne County's major climate specific business issues--we only asked which elements in each major climate area were most critical. For example, in the area "Subsidies for New Investment and Training," respondents were given a list of three issues: tax subsidies for new job creation, training assistance for new employees, and training assistance for current employees. If the respondent felt that the issue was critical, he/she was asked to check the space provided. If a critical issue in this area was not listed, the respondents were asked to describe it in the space provided. The space, however, was rarely used. Instead, respondents made heavy use of the listed issues and provided rich detail on the most critical business climate issues in each area.

A clear pattern emerged in the responses collected on critical business climate issues. Either respondents, overwhelmingly in agreement,[15] chose one issue as most critical, or there was a virtual tie between two or three issues. As shown in chart V.5, three issues were checked at a frequency that ranged from 41 percent to 46 percent: the extent of

[15] On the subject of statistical confidence, we can say that scores clustered in the middle are probably not significantly different from each other. Scores at each end of the range are likely to be quite different at a reasonable level of confidence from each other.

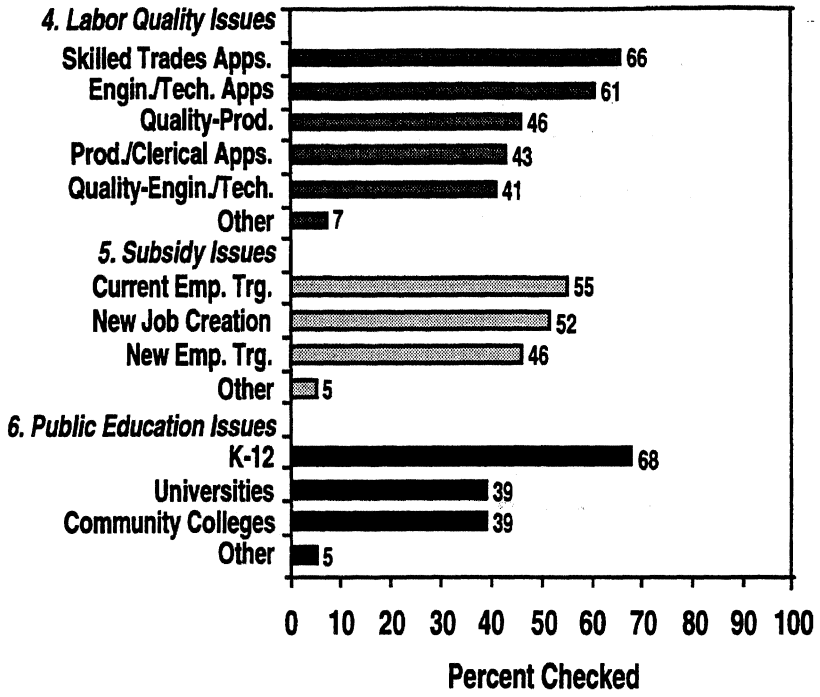
economic justification in decision-making (46 percent), [16] the permit process and the timing of environmental decisions (43 percent), and flexibility in proposed solutions (41 percent). In the case of the climate for business and property taxes, property and real tax rates was checked by 68 percent of the respondents, compared to 52 percent for single business tax rates. The single dominant issue was even more pronounced for the climate on utility rates. No less than 91 percent of the respondents checked electricity rates as a critical issue—far beyond the next closest issue, water and sewage rates at 50 percent.

CHART V.5
MOST CRITICAL ISSUES: FULL SAMPLE



[16] Generally, economic justification in decision-making, refers to a rational comparison of the economic costs and environmental benefits of environmental regulations or requirements imposed upon business. See the discussion contained in Sean P. McAlinden, and David J. Andrea, ***Michigan: Still the Automotive State?*** Office for the Study of Automotive Transportation, Transportation Research Institute, The University of Michigan-Ann Arbor, UMTRI-92-42, pages 23-28.

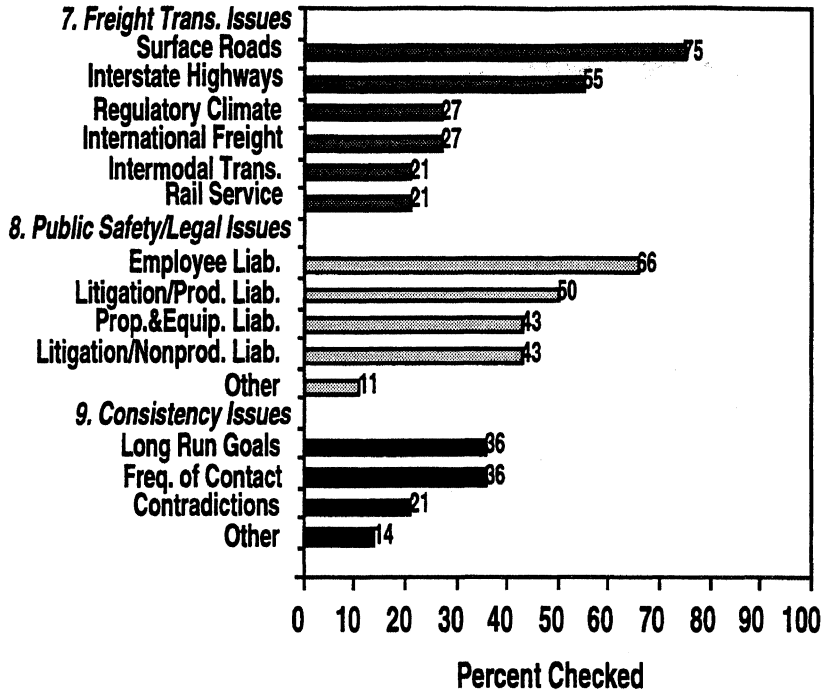
CHART V.6
MOST CRITICAL ISSUES: FULL SAMPLE



As shown in chart V.6, two labor quality issues were virtually tied in terms of the frequency of being checked as critical. The availability of skilled-trades applicants was checked by 66 percent of respondents and the availability of applicants for engineering/technical positions was checked at almost the same level, 61 percent. A similar tie existed in the area of subsidies for new investment and training, where subsidies for current employee training was checked by 55 percent of respondents and tax subsidies for new job creation was checked by 52 percent. In the area of performance of public education, however, the performance of K-12 systems was a clear stand-out: 68 percent of the respondents checked this issue as critical.

Chart V.7 contains the final results on critical issues within the three remaining climate areas. For the climate area freight transportation/ports of entry, the leading critical issue was identified as the maintenance and capacity of surface roads—checked by 75 percent of the respondents. This issue was followed in frequency by the related issue, maintenance and capacity of interstate highways, checked by 55 percent of respondents. In the area of public safety and legal issues, the leading issue was insurance rates for employee liability—checked by 66 percent of respondents. The second leading issue in this area was litigation climate regarding product liability—checked by 50 percent of respondents.

CHART V.7
MOST CRITICAL ISSUES:FULL SAMPLE

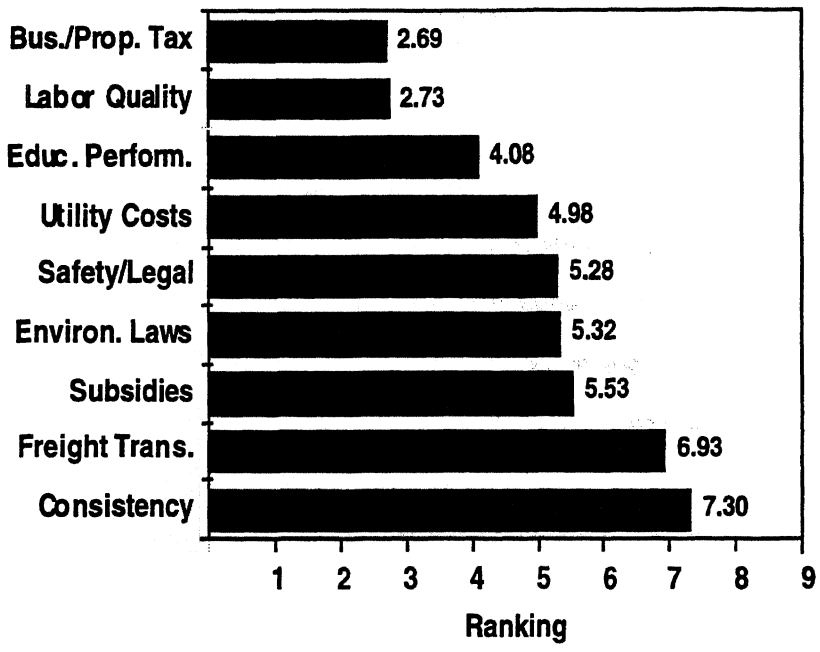


Finally, there was a rather low-order tie in the area of consistency of county economic policy. Two issues tied, but at low percentage rates (36 percent), indicative of a lack of interest in this final area of business climate. It should be pointed out also that respondents were not asked to rate Wayne County's performance in the various critical issues. Instead, they were merely asked to check issues of critical importance to their facilities. The fact that 91 percent of respondents checked electric utility rates as critical is in no way a rating of the level of these rates in Wayne County, but only an indication of the importance of electric rates to automotive facilities.

Section III: Priority Ranking of County Policy Efforts

Section III of the questionnaire asked respondents to "prioritize the nine policy/business climate areas in terms of where you believe Wayne County should best focus its policy efforts." Respondents were asked to place a number, one through nine, next to each of the nine major business climate areas—where one is highest priority and nine the lowest priority. The overall rankings for the nine areas are shown in chart V.8. There was a virtual tie in average priority between business and property taxes (average ranking of 2.69) and labor quality and availability (average ranking of 2.73) These two climate areas hold a significant lead over the next highest priority area, the performance of public education. The climate areas with the lowest priority rankings were consistency of county economic policy and freight transportation.

CHART V.8
POLICY RANKINGS: FULL SAMPLE
1 = Highest Priority, 9 = Lowest Priority



The overall rankings of policy efforts are broken out in charts V.9 through V.14 by the same subgroups discussed in the analysis of section II results. Large facilities (employment > 99) ranked business and property taxes somewhat higher in priority than labor quality and availability, but not by a significant difference. Small facilities, on the other hand, tended to rank labor quality climate somewhat higher than taxes. Small facilities also gave a higher ranking to the performance of public education as a third, distinct priority.

CHART V.9
POLICY RANKINGS: LARGE FACILITIES (EMP. >99)
1 = Highest Priority, 9 = Lowest Priority

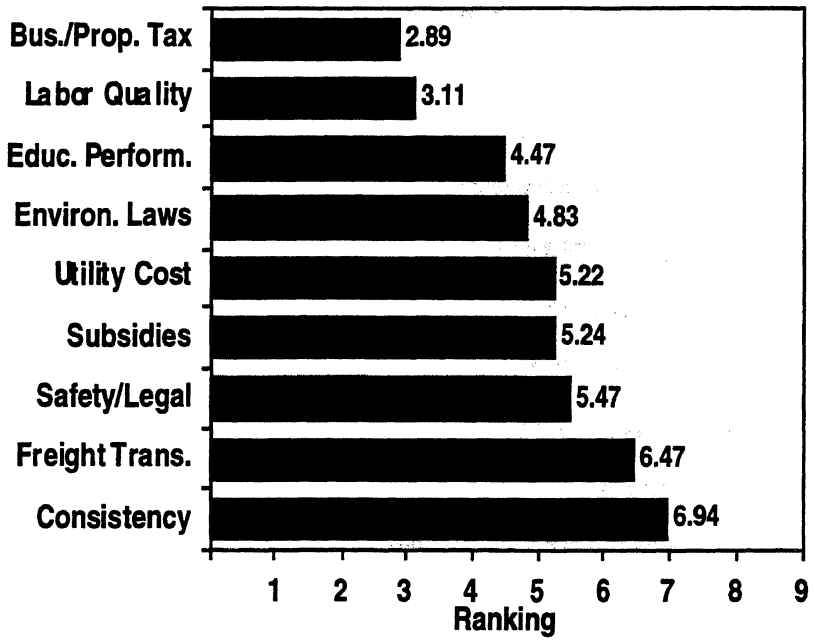
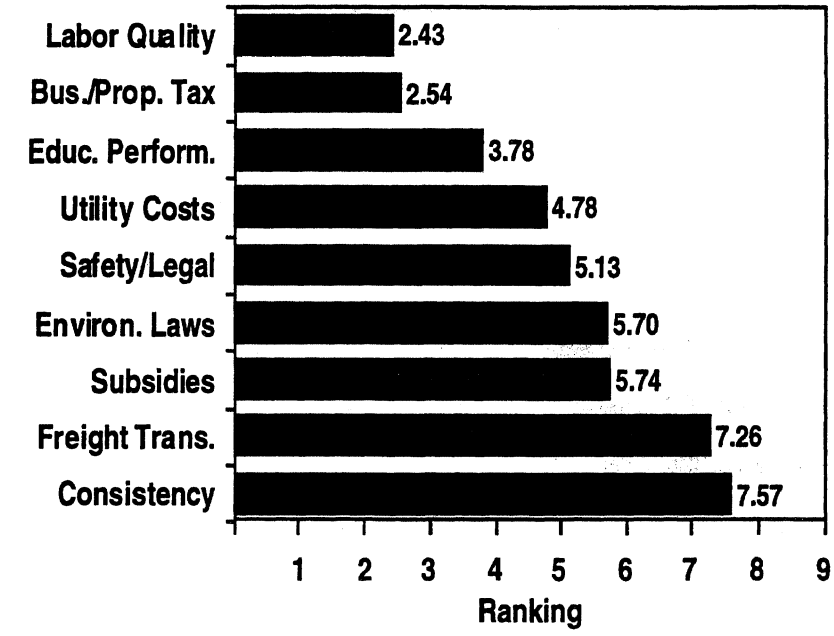


CHART V.10
POLICY RANKINGS: SMALL FACILITIES (EMP. <100)
1 = Highest Priority, 9 = Lowest Priority



Auto parts facilities (chart V.11) listed labor quality as the highest priority issue, but also listed performance of public education as a very close second, ahead of taxes. Partsmakers, who expressed the strongest intentions to increase employment, clearly are those most concerned with the quality and availability of production labor. Toolmaker/engineering facilities (chart V.12) also ranked labor quality as the highest

priority issue for Wayne County's attention, but ranked performance of public education a distant fifth. It could very well be true that these auto facilities are less interested in the immediate products of K-12 education and more concerned with the availability of labor with more advanced training and experience.

CHART V.11
POLICY RANKINGS: AUTO PARTS FACILITIES
1 = Highest Priority, 9 = Lowest Priority

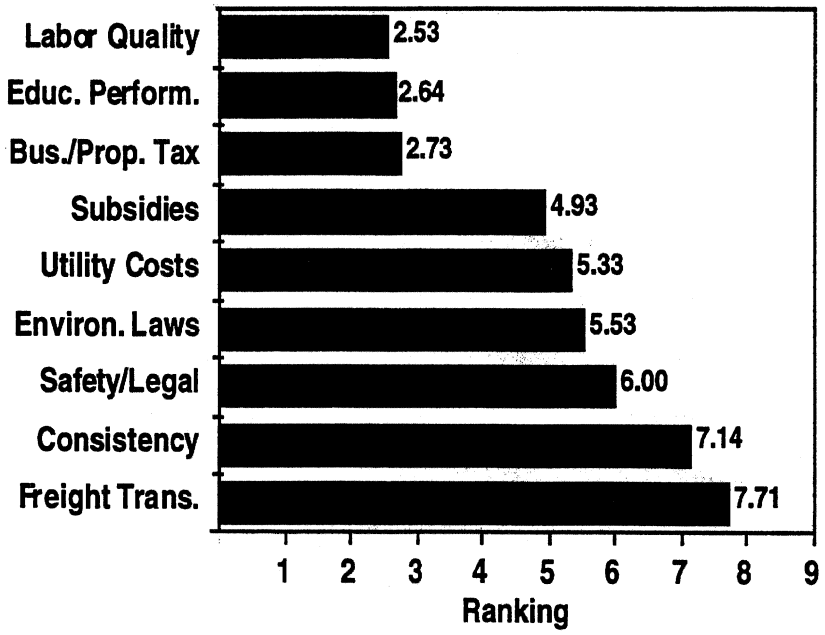
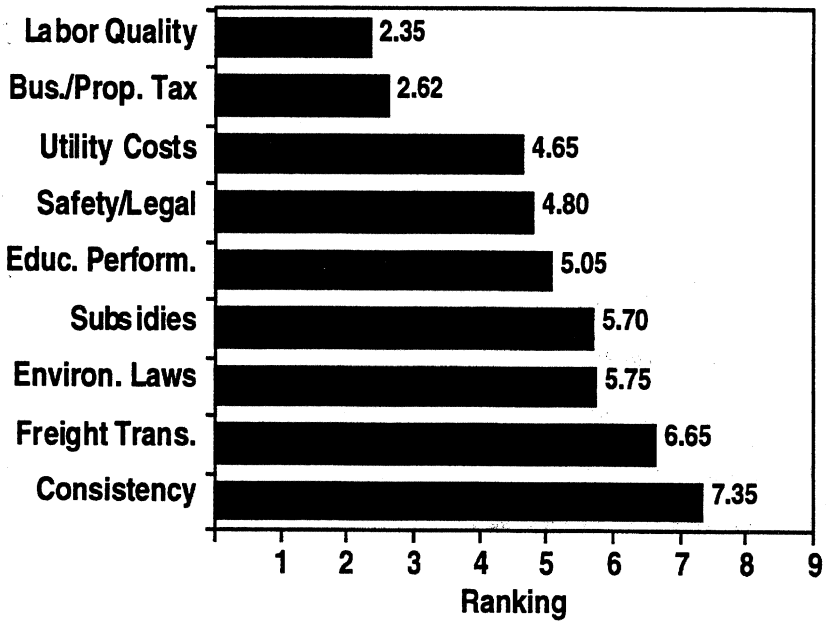


CHART V.12
POLICY RANKINGS: TOOLMAKERS AND ENGINEERING SERVICE FACILITIES
1 = Highest Priority, 9 = Lowest Priority



The comparison between firms that intend to expand employment and maintain or reduce employment, shown in charts V.13 and V.14, gives few surprise. Expanders rank labor quality ahead of taxes as a priority, but not by a significant margin. Facilities that do not expect to expand employment do give taxes a slight edge in priority over labor quality but not by any greater difference than that found for the overall sample. The final results of the section are fairly simple to deduce. Wayne County automotive facilities still regard tax rates as a high-priority issue worthy of county attention but no more so than labor quality and availability. Indeed, for several subgroups, it is the availability or lack of quality labor that is the business-climate issue of greatest concern and most in need of county policy efforts in the future.

CHART V.13
POLICY RANKINGS: EXPANDING FACILITIES
1 = Highest Priority, 9 = Lowest Priority

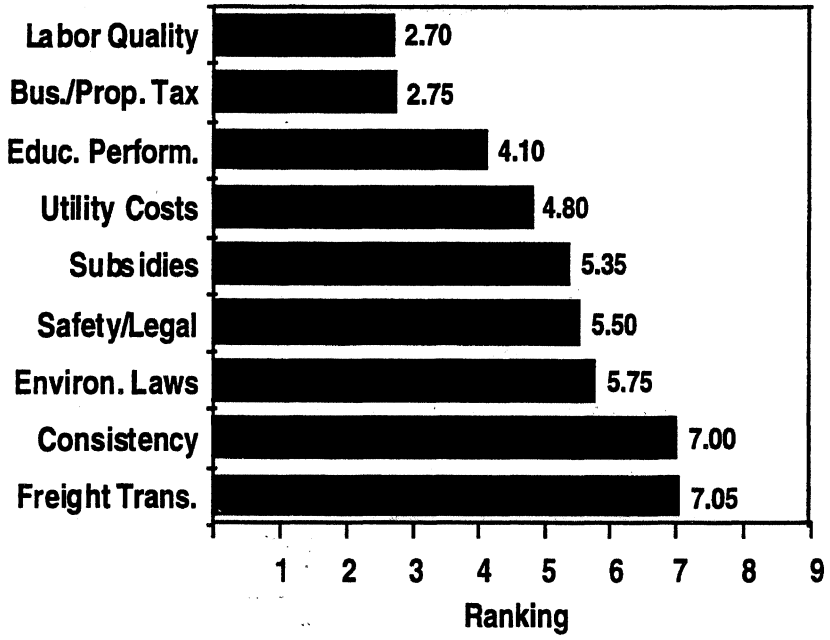
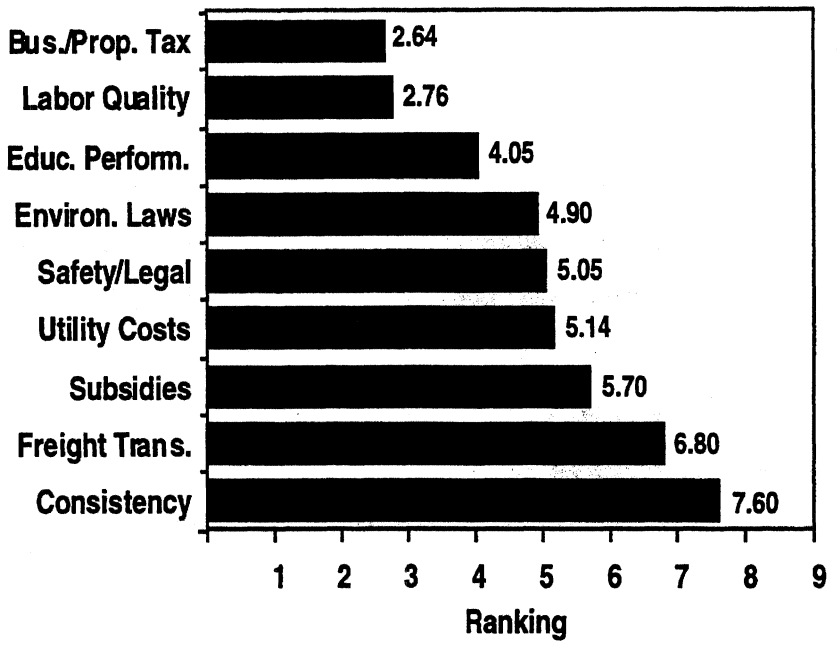


CHART V.14
POLICY RANKINGS: MAINTAIN/DECLINE FACILITIES
1 = Highest Priority, 9 = Lowest Priority



C. Conclusions and Recommendations

A major success of the first Wayne County Automotive Business Climate Survey is the performance of the questionnaire. This brief instrument was able to benchmark not only current County performance in nine major climate areas, but was also able to efficiently extract details on specific issues of critical importance to automotive facilities. The list of climate areas and issues can certainly be expanded or altered in any future survey effort. Also, the policy ranking question in section III clearly identified, with unquestioned significance, the two highest priority policy areas for Wayne County automotive facilities: taxes and the availability of quality labor.

The low rate of response to the survey(about 24 percent) was a disappointment. A low rate of response to mail surveys of business establishments has been an all too frequent occurrence for many academic and public-policy surveys in recent years, including those recently performed for other Michigan counties and in the automotive industry.

Two major reasons for low response can usually be cited. First, poor listings of actual contact names or accurate information on the facilities themselves are almost unavoidable. The automotive industry, as well as many other industries, is experiencing a period of rapid turnover in personnel, especially in management. Too often, names of plant managers, company CEOs or other contacts are out of date, and a survey addressed to the wrong individual is usually discarded. Facilities also change ownership, name or location with the same response results. Accurate listings on facilities can be obtained from the Michigan Employment Security Commission (ES202

Unemployment Insurance Benefit Information). However, no contact names (or only inappropriate names) are available through this source. Any future survey sample of Wayne County automotive facilities should start with a list screened from an overall ES202 employer list for the County. Contact names must be matched to this list of automotive facilities from other available sources. Finally, a prescreen of sample facilities should be carried out before the questionnaire is sent. This entire process would not be inexpensive.

A second reason for low response is correspondingly low incentive to respond. Busy facility managers or company executives view public-policy surveys as little more than annoying distractions. No promises of direct or effective actions to remedy their concerns are included in the cover letter. One solution to this generally correct attitude is to give visibility to current survey efforts—linked to some effort at follow-up and policy action—at the highest level of County government. Firms notice. This should raise future response rates.

The poorest response to the survey was that from facilities belonging to the Big Three automotive firms. Only five of the 29 sampled facilities responded. OSAT did receive several apologetic communications from Big Three nonrespondents. They claimed they could not respond to a survey that "had not been cleared by Corporate." The "Corporate" referred to were the government-relations or public-affairs offices of the Big Three. OSAT knows these offices well and maintains good relations with these executives. The possibility of attempting to "clear" the questionnaire with the intergovernmental relations staffs was considered. It was felt that they might offer to respond for all of their facilities in one company response. Late in the survey process, we did contact two of the offices. They offered to complete one survey or complete a company response meant to cover all of their facilities. "After all," we were told, "these guys (plant managers) don't really know these issues very well anyway." Based on other work we have performed in the area of firm location, we must disagree. Plant managers know the local business climate very well—and are eventually and heavily involved in plant location decisions.

VI. Appendices

Appendix VI.1 TECHNOLOGY-85

TECH-85 What new skills will be required in your organization in the next decade, and what educational changes should be made to provide these skills?[17]

Computer:

- Structured initiatives for training in software design methods and practices, and the use of information technology are essential.
- Validation by analysis.
- Virtual reality applications of 3D CAD.
- Rapid prototyping.
- Interdisciplinary with superior computer base.
- Engineer and designer functions are merging into one. Need new graduate engineers trained in CAD and CAE tools. Robust design/parametric design needs to be taught and experimental design/test methods to support.
- Continued growth of analysis capability.
- CAM skills acquired in college.
- Virtual prototyping.
- Better understanding of micro processors by mechanical and chemical engineers (I think this is progressing).
- More predictive/analysis skills for CAE (FEA, etc.).
- Structural mechanics; more emphasis on statistical experiments, quality tools and structural mechanics in engineering courses.
- Computer modeling.
- Enhanced (engineering type) skills of our product designers; enhanced computer modeling skills of vehicle systems and vehicles as a whole; companies must provide more educational skill type training in the future.
- Computer skills for correspondence with suppliers, managing programs and SPC will need enhancement.
- Much greater emphasis on electronic prototyping, CAD metal flow simulations.
- Manufacturing assembly and process simulation via computer.
- Modeling capabilities to evaluate parameter variations.
- Higher level of computer modeling capability.
- Even more CAD/computer skills, interconnectivity (Internet, WWW) to get more information for internal use.
- CAD and simulation tools at both product and system level.

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[17] David E. Cole, et al., *Delphi VIII, Forecast and Analysis of the North American Automotive Industry.* 3 Vols. Office for the Study of Automotive Transportation, Transportation Research Institute, The University of Michigan-Ann Arbor, UMTRI-96-01.

Continuing Education:

- There must be much greater time, money and management, and individual professional attention and effort devoted to intensive and customized career-long development of the engineering and technology capabilities of every individual engineer, engineering leader and technician. It must yield additional intellectual capability, knowledge and skill that is equivalent to what one would expect from 100 hours per year "in class" plus twice that much preparation. That learning must be customized to the next two-to-five years of each individual's likely career path and the organization's/automotive industry's likely needs and opportunities. That's a big challenge and opportunity and one that's not being met anywhere or adequately. Given the attention to total life cycle, and the progress being made and likely to be made in longer life (years and miles) parts and cars, the impact of this factor on the car market should be assessed!
- Continued education throughout employment will become even more important. "Broader picture" engineers that can develop a specialty and also look beyond it to the entire manufacturing system.
- Solid modeling; computer simulated durability; CAE; reliability analysis.
- Training must be a regular part of the program. Training skills must be learned by all leadership levels. Leadership must be actively involved in all training activities.
- A dedication to continued learning.

Culture:

- Ways to change the culture, break the molds and get faster, more nimble.
- Understanding the Japanese mindset.
- Understanding of global requirements and needs; ability to work in teams.
- People skills–collaborative decisions–teamwork.
- Language skills (particularly Japanese) as our market becomes more global.
- Global awareness of markets and cultures; interacting with people from many cultures on their turf.

Design/development processes:

- A greater understanding and definition of the engineering/product development cycle and the systems and processes involved will be needed. QS-9000 certification will help to force this issue to upper management's attention.
- Greater emphasis on the process of engineering.
- A much better understanding of the engineering process must be developed and executed. This entails training on who does what, interdependencies, and relative timing and coordination required to efficiently execute the project. I do not see enough focus on how engineering is done from concept through launch.

Economics and Cost/value:

- Economics are as important as functional requirements today. Engineers need to understand constraints better–not just forces and materials. The days of unlimited resources are long gone.

- Engineers with understanding of cost/value; introduce cost/value concepts to engineers at undergraduate level.

Manufacturing:

- Manufacturing engineers with detailed metal working knowledge and experience.
- Need more intelligent manufacturing organization.
- Logistics and sequencing.
- Engineers will need to understand lean manufacturing and design to manufacturing process capabilities.
- Manufacturing.
- Manufacturing engineers; manufacturing methods must be added to the design engineers process.
- More skilled trade personnel with tooling development capability.
- Understanding of ergonomic stressors on the assembly line; more emphasis on industrial engineering and productivity gains.

Materials:

- Need highly skilled specialists who can understand and implement new process and material technologies.
- Materials are changing so rapidly and can be tailored to specific tasks. We need a lot more materials/M.E.s/manufacturing of new materials types of people.
- Ceramic engine.
- Greater specialization in materials.

Project Management/Organization:

- Improved project/program management skills.
- Better managers, less engineers, greater marketing expertise.
- We will need training in matrix management and in operating "virtual" organization.
- Program management expertise and more program managers.
- Management skills to use resources to reduce product development time.
- Engineers will be expected to be total project manager. Managers, skills in program management, product development, process management, quality management, and customer management will be expected. Cross-functional training will be critical—universities need to push total program management.

Quality/Reliability/Durability:

- More DFMA, error proofing and involvement in process engineering—both for suppliers and internal manufacturer.
- Reliability prediction techniques.
- More statistical training for engineers (this is not progressing satisfactorily).
- Reliability engineering.

- Better knowledge of TQM is required.
- Continued emphasis on reliability/durability of vehicles over the intended useful life—will require knowledge of reliability techniques.
- Understanding of reliability/quality parameters and techniques for increasing these in every product.

Personal Development:

- Training, management championing and mentoring, consistent usage and measurement.
- Higher sense of "make it happen" and "self confidence" (motivational).

Systems Engineering:

- Systems engineering.
- More emphasis on systems engineering vs. "widget" engineering.
- More system engineers.
- Systems engineering combined with rapid decision making skills. Requires more "soft science" skills in technical organizations.
- Formal "systems engineering" skills will be absolutely essential at the OEMs and first and second tier suppliers. "Systems engineering" skills require in-house training and senior management buy in to be effective.
- Systems simulation.
- Skills on new and advanced area of current automobile technologies will be required. Skills on system engineering based on new technology will be needed. Example: laser technologies incorporated into vehicle systems.
- System integration skills; greater technical skills to absorb the greater role of supplier engineering requirements.
- Mechanical/electrical/electronics integration engineering; offer courses which require cross discipline integration.
- Major shift to systems engineering thinking/deployment; continued/expanded use of electronics to control mechanical devices—mechanical/electrical engineering skills must merge.
- Ability to clearly define system requirements.
- Design automation skills becoming crucial along with system/sub-system engineering. Educational institutions should offer more courses addressing the above. As the use of electronics increase, skills related to electronic systems engineering and software will be critical.
- Systems engineering and vehicle integration are growth areas; better linkage of packaging/ requirements engineering/design/analysis is an area of growth and opportunity.

Miscellaneous:

- Visualization skills—solid model creation skills; engineers who can do everything required to complete a program.
- We need to find easier and faster methods to translate "voice of the customer" in reliable product with perceived value.

- Scope of workers' jobs will be much greater—more tools and resources available, but greater accountability will be a key—will polarize the workforce. Including people in overall corporate direction information and rewarding them for their contributions to corporate goals.
- Math and science, even for production line jobs.
- Ability to visualize detail design and how to evaluate strength and weakness before prototype build.
- Greater knowledge of customer direction on new models.
- More knowledge of control systems and tools.
- Electronics is involved in everything.

Appendix VI.2 FAMS Description

MII PUBLICATIONS

School to Work

independent reporting on education for employment

March 6 1995 Volume 2 No 5

MODEL PROGRAM

Ford promotes manufacturing primer for high school students

A series of courses developed by the Ford Motor Company gives students an overview of the manufacturing industry and teaches them some of the skills they need for today's factory jobs.

The automaker created the program in 1990. It consists of four one-semester courses for high school juniors and seniors and guidelines for setting up internships or job shadowing visits at local plants.

This year, 25 schools in 11 states are offering the program, which is called the Ford Academy of Manufacturing Sciences (FAMS). Another 20 schools have bought the FAMS curriculum and completed the required teacher training.

The Fred P. Hamilton Career Center in Walhalla, S.C., will introduce the program in the fall. Frank Lanford, the director of the county vocational school, said the curriculum was the first he has seen that provides a thorough introduction to manufacturing. All the other materials on the market offered only "bits and pieces," he said.

"I found none that took it from the start to the finish the way this one did," Lanford said. It also is the first program designed to prepare students for the mid- and high-technology jobs that are increasingly in demand in manufacturing, he said.

In the first course, students learn about the history of manufacturing, how factories operate and possible careers in the various manufacturing industries. They also study economics principles and the ways manufacturers measure product quality.

During their second semester, students learn about statistical process control and other methods of monitoring product quality in today's highly automated factories. The third course teaches students about manufacturing technology. The fourth one has students doing analysis and problem-solving exercises based on manufacturing case studies.

The program also prescribes a paid summer internship or unpaid job shadowing stint with a local manufacturer. Work experiences are coordinated by a business advisory council.

Generic Skills

Ford developed the program because "we were concerned about preparing workers" for the modern workplace, said FAMS program manager Larry Bruno. In places such as Nashville, Tenn., where FAMS students are employed at a Ford factory that makes windshields and other glass parts, the program directly benefits the automaker by improving the skills of potential job candidates. But the program also helps other manufacturers in many places where there are no Ford plants.

"The skills in FAMS are generic [enough] to use in other industries," Bruno said.

The program prepares students for careers in manufacturing, engineering and skilled trades, according to the company.

A complete set of manuals for 25 students and Ford-run teacher training costs about $7,000, Bruno said. There are additional costs for teaching guides, computer software required for the second course and travel expenses to send teachers to company headquarters in Dearborn, Mich., for three days of training.

All costs considered, the Hamilton Center will spend between $15,000 and $20,000 to teach the first two courses next year, Lanford said.

Bruno said the courses are "academically rigorous." Students should be reading at or above grade level and have passed Algebra I to enroll in the program, Ford advised.

The program is in its second year at Calhoun High School in northwest Georgia, an area with a large carpet manufacturing industry. The school turned to FAMS to better meet the needs of the industry, which needs a more highly skilled workforce, said Jerry Carroll, director of vocational and community education. Last summer, students interned with two carpet makers, earning $6 an hour doing tasks that ranged from office work to assembly line production.

Filling The Gap

At the Hamilton Center, administrators are hoping FAMS will improve students' employability. Local manufacturers have reported that only one of 10 job applicants has the necessary work skills, Lanford said. Many unqualified candidates are technical school graduates who didn't take occupational courses in high school.

"That's the gap that we're trying to address" through the FAMS program, he said. The course will give those students the foundation to go on to technical school and become mid- and high-technology workers. A typical mid-technology plant worker commands a large, automated work station, performing a wide variety of tasks and using statistics and probability to monitor product quality, he said.

The FAMS courses will be counted as electives. Lanford said he wants to get them approved as core academic courses. ☆

FAMS Description cont'd.)

FORD ACADEMY OF MANUFACTURING SCIENCES

Preparing Students Today . . .
For the Challenging Manufacturing Jobs of Tomorrow

THE CHALLENGE

The Ford Academy of Manufacturing Sciences (FAMS) is an innovative, two-year program to prepare high school juniors and seniors for careers in manufacturing, engineering and skilled trades.

To compete in the global marketplace, companies require advanced, efficient manufacturing methods. These methods, in turn, require educated employees who understand technological processes.

Currently, there is a shortage of such employees. Yet even as industry leaders project an increasing demand for employees with the right kinds of skills, many students are not fully prepared for tomorrow's work force.

CONCEPTS

FAMS is an academically rigorous program designed to introduce students to the concepts and skills needed to **understand, work with,** and **manage** the complex and rapidly evolving processes on which tomorrow's manufacturing will depend.

OBJECTIVES

The FAMS objecuves are to:

- increase student awareness of career opportunities in a wide variety of manufacturing environments.
- offer students opportunities to learn science, math, technology, and communications skills in real-life contexts.
- encourage students to pursue post-secondary and university education.

THE CURRICULUM

FAMS consists of four accredited semester courses, taken in sequence over grades 11 and 12, plus a coordinated manufacturing experience at a local business:

The World of Manufacturing includes principles of economics, quality measurement, and an introduction to manufacturing -- its history, systems and processes, and careers.

Statistical Methods for Manufacturing Quality introduces Statistical Process Control (SPC) and other approaches to ensure quality in automated manufacturing processes.

Workplace Technologies and Applications gives a conceptual and hands-on introduction to the use of technology in manufacturing, and includes the interaction of technology with materials, energy, and the environment.

Case Studies in Manufacturing brings it all together, challenging students with analysis and problem-solving exercises based on case studies of various manufacturing situations and companies.

Coordinated Manufacturing Experience (CME), between grades 11 and 12, may be a paid summer internship or an unpaid job-shadowing experience in a manufacturing environment.

TEACHING & LEARNING

FAMS courses are taught by specially trained and certified school faculty, including science, mathematics, business, and technology teachers, who use materials and methods consistent with today's workplace. Cooperative learning, special projects, field trips and guest speakers foster student initiative and the development of skills in problem-solving, teamwork, communications, and critical thinking. Students learn how to learn in a continuously changing environment.

FAMS Description cont'd.)

ADMINISTRATION

FAMS is a partnership between a school and local manufacturers. Each program has a coordinator and up to five faculty members (including a counselor). This FAMS team meets regularly. One team member oversees the Coordinated Manufacturing Experiences (CMEs).

A Business Advisory Council consists of the school's principal, FAMS program coordinator, post-secondary educators, and several local business representatives. They arrange school-business interactions such as internships, job shadowing, plant tours, and guest speakers.

WHO QUALIFIES?

FAMS is for 11th and 12th grade students interested in applying their mathematics, science, and business knowledge and skills in a manufacturing environment. They must be reading at or above grade level and have successfully completed Algebra I. Ideally, they should also be enrolled in advanced mathematics courses.

WHO BENEFITS?

FAMS benefits students, teachers and schools, communities, employers, and America.

Students gain knowledge, skills, and job experience in a rewarding career field. Theoretical academic studies become grounded in practical applications. Students practice the creative and cooperative ways of learning and problem-solving needed for tomorrow's jobs. They gain connections with community business leaders, solid preparation for college, and a head start on a good job.

Teachers and schools gain exciting courses to offer, and innovative teaching methods they can carry over into other courses. They gain ties with the business community, and can better serve students interested in manufacturing, engineering, and technical careers.

Communities gain an education for their children that better equips them for a rewarding, productive future. They gain the employee base needed to attract companies offering quality technical jobs.

Employers gain contact with promising students, better-trained employees, closer ties with the schools, an opportunity for positive input into the high school curriculum, and community visibility.

America gains the educated work force it needs to compete in manufacturing in the global marketplace, and young citizens who see a promising future.

THE STORY OF FAMS

Recognizing the need to educate students about and for the needs of the new manufacturing sector, Ford Motor Company developed FAMS as a career academy. It is applicable to any manufacturing industry. FAMS has been operating successfully since 1990, and is now available nationwide.

COSTS

Program costs include the teacher training program, student texts and instructor guides. Computers must be available for student use. Specific cost information is available upon request.

INTERESTED?

For more information about the FAMS program, please contact:

Larry Bruno
FAMS Program Manager

Ford Motor Company
The American Road
P.O. Box 1899
Room 307
Dearborn, MI 48121-1899

Telephone: (313) 845-3052
Fax: (313) 845-5765

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Appendix VI.3 Survey Questionnaire

Wayne County Automotive Business Climate Survey
with the cooperation of the University of Michigan's
Office for the Study of Automotive Transportation

The University of Michigan Transportation Research Institute
Office for the Study of Automotive Transportation
2901 Baxter Road
Ann Arbor, MI 48109-2150
Telephone: (313) 764-5592
Fax: (313) 936-1081

Contact Sean McAlinden or Chris Booms with questions.

Please answer the following questions regarding your facility:

I.Company/Facility Background:

Current total employment at this facility _____
Years at current location _____

Sector:

_____ **Vehicle producer**

Primary activity:

___ Vehicle assembly plant
___ Component or parts facility
___ Other

_____ **Automotive supplier**

Primary activity:

___ Parts or components
___ Tooling or equipment
___ Engineering services
___ Business services
___ Other

Over the course of the next two years, do you expect your Wayne County facility to?
(Check one)

___ Expand employment___ Maintain employment___ Reduce employment

We need to obtain your assessment of current business climate conditions related to your location in Wayne County. Please rate your 1995 business climate in each area below on a scale of one to five (where one is excellent and five is poor). Next, please identify the most critical issues in each of the following nine business climate areas. Finally, please contribute any comments regarding the issue in the space provided beneath each question.

II.Ranking Wayne County's Business Climate

1. Interpreting and Implementing Environmental Laws

1995 Performance: (one is excellent and five is poor)

12345

Please check the most critical issues for your firm in this area:

___ Permit process and timing of environmental decisions
___ Size of mediation costs
___ Reasonableness or realism of decisions
___ Extent of economic justification in decision-making
___ Flexibility in proposed solutions
___ Other, please describe below:

Comments:

_____

_____

2. Business and Property Taxes

1995 Performance: (one is excellent and five is poor)

12345

Please check the most critical issues for your firm in this area:

___ Single business tax rates
___ Extent of capital asset depreciation allowance
___ Property and real tax rates
___ Availability and level of industrial tax abatements
___ Other, please describe below:

Comments:

_____

_____

3. Utility Rates

1995 Performance: (one is excellent and five is poor)

1 2 3 4 5

Please check the most critical issues for your firm in this area:

___ Electricity rates and service reliability
___ Natural gas rates and service reliability
___ Water and sewage rates and service reliability
___ Other, please describe below:

Comments:

_____

_____

4. Labor Quality and Availability

1995 Performance: (one is excellent and five is poor)

1 2 3 4 5

Please check the most critical issues for your firm in this area:

___ Availability of applicants for engineering/technical positions
___ Availability of applicants for skilled trades positions
___ Availability of applicants for general production/clerical positions
___ Quality of engineering/technical applicants
___ Quality of applicants for production positions
___ Other, please describe below:

Comments:

_____

_____

5. Subsidies for New Investment and Training

1995 Performance: (one is excellent and five is poor)

1 2 3 4 5

Please check the most critical issues for your firm in this area:

___ Tax subsidies for new job creation
___ Training assistance for new employees
___ Training assistance for current employees
___ Other, please describe below:

Comments:

_____

_____

6. Performance of Public Education

1995 Performance: (one is excellent and five is poor)

1 2 3 4 5

Please check the most critical issues for your firm in this area:

___ Performance of local K-12 systems
___ Performance of local community colleges
___ Performance of local universities
___ Other, please describe below:

Comments:

_____

_____

7. Freight Transportation/Ports of Entry

1995 Performance: (one is excellent and five is poor)

1 2 3 4 5

Please check the most critical issues for your firm in this area:

___ Maintenance and capacity of surface roads
___ Maintenance and capacity of interstate highways
___ Adequacy of rail service
___ Capacity of international freight services
___ Access to intermodal transportation
___ Regulatory climate for freight transportation
___ Other, please describe below:

Comments:

_____

_____

8. Public Safety/Legal Climate

1995 Performance: (one is excellent and five is poor)

1 2 3 4 5

Please check the most critical issues for your firm in this area:

___ Litigation climate regarding product liability
___ Litigation climate regarding nonproduct liability
___ Insurance rates on property and equipment
___ Insurance rates for employee liability
___ Other, please describe below:

Comments:

_____

_____

9. Consistency of County Economic Policy

1995 Performance: (one is excellent and five is poor)

12345

Please check the most critical issues for your firm in this area:

___ Frequency of contact with economic development authorities
___ Contradictions between county policies (for example: environmental versus economic development)
___ Long run goal setting
___ Other, please describe below:

Comments:

_____

_____

III.Priority Ranking of County Policy Efforts

Please prioritize the following nine policy/business climate areas in terms of where you believe Wayne County should best focus its policy efforts. Place a number (1 has the highest priority and 9 the least priority) in the space directly under the word "priority."

Priority:

_____ 1. Interpreting and Implementing Environmental Laws

_____2. Business and Property Taxes

_____3. Utility Rates

_____4. Labor Quality and Availability

_____5. Subsidies for New Investment and Training

_____6. Performance of Public Education

_____7. Freight Transportation/Ports of Entry

_____8. Public Safety/Legal Climate

_____9. Consistency of County Economic Policy

Comments:

_____

_____

Appendix VI.4 Wayne County Automotive Business Climate Survey: Selected Survey Results and Edited Comments

Interpreting and Implementing Environment Laws: rating = 3, ranking = 5.32
Two facilities indicated that they are not sensitive to environmental laws. Another firm expressed concern that investment would leave the county because it is close to being a nonattainment area.

Business and Property Taxes: rating = 3.33, ranking =2.69
Two comments stated that the wide range of taxes are prohibitive to doing business in Wayne County. One comment indicated that property taxes provide poor incentives. By taxing new equipment purchases, property taxes scare off investment which can create high paying, tax generating jobs.

Utility Rates: rating = 3, ranking = 4.98
Three responses indicated that utility rates are excessively high in Wayne County. A couple of comments on water indicated that supplies of water are inadequate in the summer and the water is not suitable for drinking. Four comments addressed electricity reliability problems, although there was some indication that the problems are being addressed.

Labor Quality and Availability: rating = 3.05, ranking = 2.73
Respondents expressed much of concern about labor quality and availability. Responses on labor quality were mixed. Several responses praised the quality of the available labor while two criticized work ethic and motivation. Availability of labor was a widely expressed concern with seven responses detailing problems. Most of the availability complaints addressed severe shortages of skilled laborers. Several respondents indicated that high school curricula fail to prepare noncollege bound students for the working world. One respondent indicated trouble finding high school graduates with good math, science and communication skills for jobs paying $50,000 dollar per year.

Subsidies for New Investment and Training: rating = 3.67, ranking = 5.53
Ten responses on the topic of subsidies indicated that companies are unaware of subsidy programs. Several comments suggested the desire for subsidization of training for new and current employees.

Performance of Public Education: rating = 3.38, ranking = 4.08
Several comments indicated that there is a mismatch between the preparation provided by the educational system and skills needed in the workplace. Several comments focused on deficiencies in math, reading and writing skills. A couple comments addressed perceived motivation and discipline problems.

Freight Transportation, Ports of Entry: rating = 2.68, ranking = 6.93
Several freight comments addressed the poor condition of roads in Wayne County. A couple respondents described inadequacies of the railroad system in Wayne County.

Public Safety, Legal Climate: rating = 3.43, ranking = 5.28
Several problem areas were identified in relation to safety and legal issues. A few comments addressed safety and security concerns and the negative effect these concerns have on attracting new hires. Several comments addressed the high costs of product liability and litigation. The effect of legal actions driving up insurance rates was also mentioned. Workmen's compensation was identified as a high cost with high uncertainty associated with settlements.

Consistency of County Economic Policy: rating = 3.06, ranking = 7.3
Respondents expressed a lack of public involvement with business on economic development. One respondent called for a shift of focus from large projects like stadiums to helping small businesses flourish.