

Accelerating the Growth of the U.S. Automotive Manufacturing Industry at Home, Rather than Abroad

What does industry need to do to increase investment in the Southeast Region?

Prepared for:

Southern Automotive Research Alliance (SARA)

Prepared by:



3005 Boardwalk, Ste. 200
Ann Arbor, MI 48108
www.cargroup.org

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Dr. Jay Baron, President & CEO

Brian Esterberg, Director

Bernard Swiecki, Senior Project Manager

About CAR

The Center for Automotive Research is a non-profit organization based in Ann Arbor, Mich. Its mission is to conduct research on significant issues related to the future direction of the global automotive industry, organize and conduct forums of value to the automotive community, and foster industry relationships.

For more information, contact CAR at:

3005 Boardwalk, Suite 200 Ann Arbor, MI 48108

734-662-1287 www.cargroup.org

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Executive Summary

Study Structure

This study is divided into two distinct sections. A summary of the study, as well as the recommendations, is provided in the first section (pages 1 – 13). This shorter section provides the reader a comprehensive picture of the findings and resulting recommended next steps, and can be used as a document onto itself. For readers seeking a more detailed analysis of the study findings, a second section follows. This section includes more depth on the results of the research performed, as well as charts and graphs to support and clarify the issues discussed.

Introduction

Automotive investment, and in particular vehicle assembly plants, are considered critical economic development targets. Automotive manufacturing requires a deep supply chain providing thousands of parts, as well as raw materials, and other goods and services. Analysis by the Center for Automotive Research (CAR) indicates that each job at a vehicle assembly plant produces eleven additional jobs in the U.S. economy. Automotive investment can therefore be of critical economic value not just to the community and state hosting the investment, but to the entire region around the assembly plant, typically spanning several states as part of the overall supply chain.

A vibrant and growing auto industry driven by investment and employment growth can result in a greater density in the U.S. supply chain. Many international manufacturers have aggressive localization objectives designed to expand regional supply chains. In the southern automotive industry, supply chain expansion is often impeded by barriers common throughout the region, indicating an opportunity to identify synergies for the region. This CAR research initiative examines the critical success factors necessary for continued global automotive investment growth within the southern U.S. automotive manufacturing region.

The states funding the effort include Alabama, Kentucky, Louisiana, Mississippi, South Carolina, and Tennessee, which are referred to in this study as the Southern Automotive Research Alliance (SARA). Through the support of key automotive states and regional interests, this study seeks to address the common challenges and identify actionable recommendations aimed at supporting states as they strategize collaborative efforts to attract new automotive investment and create more automotive employment in the United States, and particularly in the Southeast region.

Purpose of Study and Methodology

The SARA study was commissioned by the southern automotive states to help inform the region about the needs and problems faced by the automotive industry stakeholders in the region, and to capture and analyze this “voice of the industry” perspective into possible actionable recommendations to help improve the region’s competitiveness to support, retain, and attract automotive investment and to grow U.S. employment.

In order to provide a robust view of the region's automotive environment, CAR conducted more than 40 interviews with key industry stakeholders. CAR's interviewees included representatives at ten automaker facilities, as well as dozens of automotive suppliers, educational institutions, and other regional stakeholders. The results of these interviews were then combined with a comprehensive literature search, as well as input from CAR staff subject matter experts, to produce a set of recommendations intended to provide the basis on which to begin to improve the region's competitiveness through the implementation of collaborative efforts with regional scope.

Building a Roadmap to a New Era of the Southern Automotive Industry - A Time of both Opportunity and a Need to Take Action

Following decades of expansion, the growth of the automotive industry in the SARA region has slowed. CAR forecasts call for mild growth in vehicle production volumes and for employment to level off over the coming years. Since the last assembly plant in the region was announced in 2009, every subsequent North American automotive assembly plant announcement has been a Mexican location. While no region in the country can be ruled out as a potential site of a future automotive assembly plant, the pursuit of these facilities can no longer be at the forefront of the region's economic development strategies. As is the case in the upper Midwest, the SARA region therefore now competes largely for expansion of automakers' existing facilities in the region, as well as additional automotive supplier investment.

In this environment, regional collaboration, strong relationships with companies, and an awareness of industry trends and developments are more important than ever. Because this region finds itself in a new automotive era, it needs new strategies to help it compete. The recommendations provided in this study are intended to provide a framework for how the region can adapt to its new environment – and how it can position itself to continue to experience expansion of its automotive endowment.

The Emergence of Mexico as a Key Competitor

According to CAR's Book of Deals database, which tracks automaker and major supplier investments, Mexico attracted \$1.5 billion in automotive investments in 2013 – three times more than the \$0.5 billion that was invested in the SARA region for the year. In addition to manufacturing, both automakers and suppliers report increasing reliance on Mexico for engineering, as well. Mexico is therefore emerging as a key competitor not just for manufacturing jobs but also for the high-paying white collar jobs provided by R&D operations.

In addition to low cost labor, a key reason for Mexico's success in attracting automotive investment is its many free trade agreements with countries around the world. Mexico has Free Trade Agreements (FTAs) with over 40 countries, and roughly 70% of the world's Gross Domestic Product (GDP) can be accessed tariff-free from Mexico. No other country in the world boasts an equivalent export environment. With easy access to both the Atlantic and Pacific oceans, Mexico's access to global markets has been a powerful tool in attracting automotive investment. This is particularly true for automakers such as BMW and Audi, which are specifically planning for their Mexico operations to be global export hubs for the vehicles they will produce.

The competitive threat posed by Mexico provides a key motivator for the SARA region states to embark on new, collaborative initiatives such as those posed in the Recommendations section of this study. Individual states can only exert a mild influence in compelling the U.S. federal government to improve the export position of the U.S. in order to compete with Mexico's trade environment. Engaging in these initiatives is therefore particularly critical to win new investment through regional collaboration.

Summary Findings: Workforce

The availability and interest of qualified workers was overwhelmingly cited by the companies interviewed for this study as the region's greatest obstacle to attracting new investment. Deficiencies were reported not only in availability of sufficient quantities of applicants but also in the capabilities and qualifications of the region's labor pool. Companies reported that while engineering candidates with specific qualifications (such as mechatronics expertise) can be difficult to find, they generally are able to fill engineering openings within a reasonable amount of time. Likewise, companies reported that availability of production workers is generally adequate, though there is variation from one community to another.

Overwhelmingly, interviewers indicated that they have the most difficulty finding qualified maintenance associates. Maintenance associates are needed to install and service equipment at production facilities, as well as perform a variety of other functions more technical in nature than those typically performed by production employees. Because maintenance associates need more education and training than production employees but don't need the bachelor's degree typically required for engineers and management professionals, they are sometimes referred to as "the missing middle." Maintenance associates typically have either an associate's degree or appropriate training from a community college or vocational school. They also typically need to complete an apprentice program in a production facility before they are considered fully qualified. Even when qualified candidates are found, they often don't stay with the employer who trained them, opting instead for other types of work. The availability of qualified maintenance candidates was identified by the companies interviewed as the most pressing factor hurting the competitiveness of the region in attracting additional automotive investment. This study therefore makes several recommendations for improving both the number of available candidates, as well as the qualifications of the candidates produced by the region's educational institutions.

Summary Findings: Supply Chain Density

Because companies want to be the employer of choice in a given community, the southern automotive industry is characterized by a wide distribution of automaker and supplier facilities throughout the region. Lack of density leads to the absence of the critical mass that supports local educational resources that can create the type of skilled/maintenance workforce pipeline required for continuing industry development. It can be challenging for all but some of the largest automotive employers to create effective and convenient apprenticeship programs in isolation. Also, it can be challenging to attract engineers and white collar employees to rural areas, or areas without adequate cultural or educational institutions for their families.

While the low density of the region's automotive endowment has helped alleviate local labor shortages for some companies, it has had a number of other consequences. The distributed nature of the automotive industry in the SARA region has not allowed the various companies in the region to realize the benefits of clustering. One such consequence is that the industry in the region is not dense enough to attract an appropriate tooling company presence. Tooling companies interviewed by CAR indicated they have little incentive to increase their presence in the South as they are straining to satisfy current contracts. Likewise, they indicated that locating a facility in the region would be problematic because of the lack of qualified employees and other resources, as well as the fact that the distributed nature of the region's automotive industry would make it inefficient to serve such a large area, with relatively few customers, from a new location. Given the need to truck equipment through the region, the companies indicated that the minimal additional shipping cost of trucking tools to be worked on in their northern facilities is usually an acceptable cost. While tooling suppliers provide an excellent illustration of the challenges posed by the lack of automotive concentration in the region, additional problems, such as increased cost of freight and logistics, also result. This study makes several recommendations to improve the region's competitiveness in this respect.

Summary Findings: Attraction and Business Environment

Automakers and suppliers engage in a rigorous process of communication and analysis when they consider future investment decisions. Interviews revealed that communities which stand the greatest chance of attracting these investments are those which not only offer the most competitive incentive package but those which also streamline, centralize and optimize their engagement with companies. The dozens of interviews performed as part of this study revealed that companies have strong preferences for the types of communities they prefer to invest in, as well as their overall relationships with government officials and economic developers.

When considering a new investment, companies consider a wide array of decision factors. Regional factors, such as transportation costs, customer and supplier locations, and availability of an adequate workforce dictate more broadly where a facility location is desired. Local factors, such as site access, utility costs, and incentive packages then help the company choose between specific locations. In order to track and score these factors, companies typically have a matrix, spreadsheet, or other document in which the information sought and received from the communities is tracked. Such tools also typically track the costs of construction, launch, operation, utilities, and transportation. The communities considered are typically also rated on more qualitative factors, such as quality of life, crime levels, and others. Because bids from different communities are not standardized, companies go through an intense process to make the various locations considered easier to compare to each other.

While all of the factors discussed above are taken into consideration, incentives are a critical part of the puzzle. While incentive size and composition, such as the availability of upfront grants and training funds for incumbent workers as well as new hires, were key factors, interviewees also stressed the critical role played by incentive enforcement. The companies interviewed stressed that they are more likely to invest in a community if both the community and the state perform incentive audits and monitoring in a manner that isn't onerous for both the company and the various levels of government involved.

Interviewees also discussed their frustration with differing laws and regulations from state to state in the SARA region. A key example is the potential for regulatory standardization for trucking rules and regulations. Given the industry's increasing focus on logistics costs, this is a critical area where standardized and regionally-coordinated regulations could improve the competitive position of the region. Other legal areas, such as workforce regulations, incentive auditing, and enforcement, present additional standardization opportunities in the region.

Summary Findings: Research and Development

Research and Development (R&D) provides the SARA region with an opportunity to attract investment that brings high-paying jobs which further help generate a highly-skilled workforce. Research activities are typically long term and result in the creation of new processes or products as opposed to preparing for production. Development is applied, typically short term, and often associated with launching new products.

While research activity is more likely to be performed at a company's headquarters, development work is more distributed among the firm's facilities and therefore presents a greater opportunity for the SARA region. On the research side, the region boasts world-class universities and several government laboratories that can be an asset to automakers and suppliers struggling to meet upcoming fuel economy and safety regulations, as well as consumer demand for increasingly sophisticated vehicles and components. Given that automotive firms are increasingly open to accepting new technologies from non-traditional sources, these needs present an opportunity for the SARA region to benefit from additional research activity.

The companies interviewed in this study indicate that their corporate parents, whether in North America or overseas, are increasingly short of R&D capacity in their operations. As a result, they are more dependent on the facilities they have in the SARA region taking on additional development responsibility. This study discusses several collaborative efforts underway in the region, and makes recommendations on how such efforts could be further interlinked and run in a collaborative fashion.

SARA Regional Initiative Recommendations

A Call to Action: The Need for a Formal Southern Automotive Alliance

The research performed for this study provided valuable insight into the needs of the automotive industry in the SARA region. This section outlines regional recommendations based on this research. Before undertaking any of these recommendations, however, it is necessary for the SARA region states to coalesce around a common strategy and form an alliance to undertake the recommendations to be selected by the group, as well as to engage in other initiatives to help the region retain and attract automotive investment. As the recommendations are regional in nature, regional coordination will be necessary to execute them to their full potential. It can be said that the region has reached the limit of what can be achieved using previous methods of state-to-state competition without regional coordination. While state-to-state competition will always exist, adding a degree of regional collaboration will benefit the competitive position of each member state, thereby benefitting the region

as a whole. Given the rapid ascent of Mexico as a powerful economic development rival, as well as other global competitors and the increasing sophistication of the automotive industry itself, these regional initiatives are the necessary next competitive step for the region.

Proposed Framework for a Southern Automotive Alliance

Based on the “voice of industry” insight achieved through this study, CAR recommends that SARA region states form a Southern automotive alliance. Each of these states already has an automotive association that already includes many of the key individuals to include in such a regional body. This includes specialists from economic development, education, state agencies, and the like. Given that the associations have already engaged with each other on collaborative efforts (such as the Southern Automotive Conference (SAC)), their coalescence into a formalized body is a natural progression on the way to regional cooperation. The presidents of these associations, as well as selected top officials from each state, could therefore serve as a Board of Directors of this regional organization. The formation of such an organization would require intensive dialogue between the potential member states to determine how the organization would be structured and how it would engage the State governments, automotive manufacturing associations, educational institutions, and industry. The funding model, means of administration, and activity coordination would also have to be considered and established.

CAR’s experience in facilitating both private and public coalitions indicates the Southern automotive alliance would be most effective if it were coordinated by an independent organization without a vested interest in the SARA region. This approach will enhance both the authority and the effectiveness of the organization, as it will help ensure that the initiatives undertaken by the group benefit the entire region, as opposed to being skewed to one or more member states.

Initiatives undertaken by the organization, which would be at the non-competitive level, could be guided by the recommended actions below, which are based on the insights achieved through this study.

Attraction and Business Environment Recommendations

While individual states, as well as communities within those states, will always compete with each other for new investment and expansions of existing facilities, there is ample room for regional collaboration to bolster the attractiveness of the SARA region as a whole. Essentially, regional collaboration on attraction and business environment initiatives increases the likelihood that a given investment lands in the SARA region. Competition between states and communities then determines where in the region that investment will materialize. The recommendations described below provide the SARA member states with clear steps they can take to improve the region’s opportunities for attraction and retention of automakers and suppliers.

1: One-Stop Shop for Investment Opportunity Marketing

CAR recommends that SARA region states embark on a series of steps to standardize and centralize initial contact with prospective investors. Companies report frustration with the variety of approaches individual communities take in creating incentive and investment packages, which makes comparing investment options difficult and forces the companies to undertake onerous procedures for standardizing the offers and analyzing the true total costs contained within them. While a complete one-

stop shop for the entire SARA region can only come about as the result of a gradual and ongoing process, a phased approach will allow the effort to quickly bear fruit while working toward a more heavily integrated approach.

This recommendation is closely connected with Recommendation 2: Automotive Investment Preference Analysis, which would provide detailed information on specifically which changes automakers and suppliers would like to see in how communities make investment offers. As an initial step, CAR recommends the SARA region states create an investment proposal standardization council in order to determine which terms, financial calculations, and investment proposal characteristics show the greatest potential for standardization. Once these initial items are identified, SARA member states will be able to quickly propagate the changes in their procedures, allowing for a quick return on the effort.

Once a higher degree of standardization has been achieved, CAR recommends the creation of a regional website highlighting investment opportunities in the region using the standardized format collaboratively developed by the region's stakeholders. After companies select several sites with the potential to meet their needs, the individual communities would then compete to attract the investment.

Ultimately, the SARA member states could create an apolitical regional entity to serve as the region's one-stop shop. Comprised of representatives of the SARA member states, this body would serve as companies' initial point of contact with the region and allow them quick access to the region's economic developers, political leaders, and environmental regulators, as well as standardized investment packages. Having made their initial selections, companies would then engage directly with the economic developers from the states and communities of interest to solicit more competitive packages and negotiate final terms.

Standardizing and centralizing initial contact with prospective investors is particularly valuable when competing with Mexico for investment. As previously mentioned, a company considering making an investment in Mexico often works with a representative of the Mexican federal government who can coordinate with local, state, and federal government officials and regulatory agencies. In contrast, when considering investment in the US, the company must approach each individual state independently, and then it has to work with multiple levels of public officials and regulators within each state. The increase in complexity and workload is a key reason for this recommendation. Because the region cannot receive the federal economic development coordination provided in Mexico, it must undertake its own regional initiatives in order to compete.

2: Automotive Investment Preference Analysis

In order to better inform the actions undertaken in Recommendation 1, as well as to provide insight into the preferences companies have in the investment offers they receive from communities, CAR recommends the SARA member states jointly embark on an analysis to determine specifically how automakers and suppliers would like to see investment packages structured and which changes would increase the probability they would invest in a given community.

The subject matter to be covered in such an analysis includes the terms, financial calculations, and incentive characteristics that bring the greatest potential for clarification and standardization. The study would result in an architecture for an “ideal incentive package” that would then be used by the member states and their communities to both enhance their chances when forming offers for individual companies and to better inform the process undertaken in Recommendation 1: One-Stop Shop for Investment Opportunity Marketing.

3: Increased Standardization of Business Regulations

Automakers and suppliers indicate that because of the crossing of state boundaries by both their supply chains and their workforce, the SARA member states can undertake a variety of regulatory standardization efforts to make locating, employing, and supplying the region’s automotive endowment more favorable and efficient. These efforts are likely to be of particular appeal to automakers and suppliers from Asia and Europe, who are more accustomed to regulations at the federal level and are therefore more likely to find differing regulations from state to state to be challenging.

One practical example of an area of regulation that could be standardized across the region is trucking rules and regulations. Because states have different regulations related to axle weight, number of trailers allowed, and other aspects of trucking, companies are forced to either offload or reload trucks that travel between states or reduce the efficiency of their logistics operations by configuring all loads to the most restrictive regulations found throughout the region. Standardized regulations would eliminate this waste of time and resources. This issue is particularly timely as automaker and suppliers report greater scrutiny of transportation and logistics costs due to the need for just-in-time shipping, reduced inventory cushions, and scrutiny of fuel costs.

Additional areas ripe for business regulation standardization include workforce regulations, incentive auditing and enforcement, and others. The members of the SAA proposed above would be a key source of recommendations of other areas where a material impact could be made through regulatory standardization in order to increase the region’s attractiveness to both automakers and suppliers.

4: Mexico Competitiveness Analysis

CAR recommends that the SARA Region states embark on an analysis of Mexico’s competitive position for the attraction of automotive investment. Such an analysis would investigate the factors that help Mexico attract investment, such as cost and trade advantages. Additionally, the analysis would investigate competitiveness factors where the SARA Region has advantages over Mexico, such as safer working environments, better logistics environment, better availability of key components and raw materials, etc. Such an analysis would be valuable both to guide the states in their efforts to compete with Mexico and also serve as an independent verification of areas where the region competes favorably with Mexico.

Workforce Recommendations

Foreign investors often cite a skilled workforce as the most critical criteria in their location decisions, and it plays an equally important role for domestic firms. CAR found that in the SARA region, skilled workforce needs are the most acute. The “missing middle” was a consistent concern in the region.

A regional approach will be most effective in initiating workforce improvement efforts to address the region's workforce challenges. While the need for a larger skilled/maintenance workforce is most pressing, SARA participants should also be cognizant of building human and intellectual capital at all tiers of the workforce pool. Even entry-level manufacturing jobs require levels of skill and training that were not necessary in previous decades, so preparation for a career in the automotive industry begins with a rigorous and relevant secondary education.

CAR has four primary recommendations to begin to address the skilled/maintenance workforce issue in the SARA region. The recommendations focus on industry perception, apprenticeship programs, programming at community/technical colleges, and a detailed assessment of the automotive industry's workforce needs.

1: Collaborate on Efforts to Improve the Perception of the Automotive Industry

Throughout the interviews performed for this study, the interviewees pointed out that their recruiting efforts are hampered by the negative image prospective employees have of the automotive industry, as well as manufacturing in general. Many of these perceptions are based on outdated notions about the dirty, dangerous, and physically demanding manufacturing facilities of the past. Today's modern manufacturing facilities present an opportunity to counter these beliefs.

CAR recommends the SARA region states collaborate on initiatives to improve the perceptions of the automotive industry and manufacturing in general. While public awareness campaigns to reach students as young as those in grade school are a possibility, interviewees also indicated a need to reach out to parents, who have tremendous influence over the career decisions made by their children. In addition to providing literature and other information to schools, the region could also undertake online initiatives, as well as holding events to host both students and their families in modern, state of the art manufacturing facilities.

2: Implement Government-Supported Regional Apprenticeship Programs

Apprenticeships are fundamental to building and retaining a viable skilled workforce, yet apprenticeship programs have been declining in number for several years. Apprenticeship programs incorporate both classroom and paid on-the-job experience. Strengthening the pool of automotive industry apprenticeship programs available in the SARA region, especially those focusing on mechatronics, is paramount. By creating a regional program, employers will know exactly what to expect from graduates, and participating educational institutions will benefit from lower costs of design and implementation. States can help bring greater access to rural areas where skilled trade workforce shortages are particularly acute. CAR recommends:

- A regional effort to design and implement focused and effective apprenticeship programs that meet the specific needs of automotive OEMs and suppliers. As an example, the region can use validated curriculum from the Automotive Manufacturing Technical Education Collaborative (AMTEC), a collaboration of community and technical colleges and industry partners. The goal of AMTEC is to better prepare highly-skilled workers for automobile manufacturing and technology jobs. Within the region, states can implement the program through community and

technical college networks in cooperation with local industry partners. More than one employer can sponsor a single apprentice, providing access to candidates that they otherwise may not be able to sponsor due to financial constraints.

- Greater public funding to support apprenticeship programs. Governments can offer subsidies to employers, particularly smaller employers, increasing access to programming. The region should promote the fact that apprentices traditionally graduate with no debt and enjoy a high starting rate of pay, and should institute programs to assist the industry in matching the most qualified students with apprenticeship programs to ensure the greatest levels of success.

3: Regionally Integrate Coordination of Technical and Community College Assets

Technical colleges traditionally offer two types of training options. First, technical colleges offer degree-track, credit classes, leading most often to associate level degrees or certificates. Second, technical colleges offer non-credit training courses which do not contribute to progress towards a degree or certificate. These courses are typically aimed at specific training needs for job-related skills.

Collaboration between the two sides of these institutions is often limited. Innovation in this area can contribute to increased intellectual and human capital. CAR recommends two types of changes within the SARA region's technical colleges to better prepare the future workforce for the automotive industry.

- Use non-credit program departments to better inform other school departments about what the industry needs. Non-credit courses are offered at technical colleges to directly meet industries' immediate needs. Due to their direct connections with industry, non-credit divisions of technical colleges generally know what skills companies are willing to pay for. This valuable voice of industry can be used to inform for-credit departments and is too often overlooked. Often the two sides of these institutions have little communication, forgoing opportunities to increase the relevancy of their degree level program offerings. The region's community and technical colleges should create working groups within their institutions to facilitate academic and workforce department communications to more effectively integrate the voice of industry, and provide students with skills in demand in the automotive industry.
- Integrate credit and non-credit programming to facilitate and encourage continued attendance and human capital development by offering fractional credit for non-credit programming. Technical colleges can offer fractional credits for non-credit granting programming to bridge students into degree granting programming with otherwise unearned college level credit already in place.

4: Perform a Comprehensive Regional Automotive Labor Needs Analysis

Continued research to gain an in-depth understanding of the specific automotive industry workforce needs in the region as well as the most efficient means to deliver effective workforce training is needed. CAR recommends a detailed study to help formulate policy and programming to address workforce issues that have the potential to prohibit investment in the region. The study should address the following:

Answer the following key questions: How many people with relevant skill sets will be needed in 2, 5, and 10 years? What skills will these employees need to have? What levels of education will be necessary? What proportion will be experienced vs. new hires? What are the anticipated turnover and attrition rates? What are the expected salary ranges for relevant occupations? What factors will drive automotive industry employment and skill needs? The first section of the study would focus on the labor market outlook, needs, and gaps in regional automotive industry skilled/maintenance workforce, as well as regional and state level policy recommendations for skilled/maintenance workforce development, attraction, and retention. The second section of the study would focus on the labor market outlook, needs, and gaps in the broader automotive industry, and regional and state level policy recommendations for development, attraction, and retention with the broader automotive workforce.

5: Automotive Workforce Summit

Based on feedback directly received from automakers and suppliers, CAR recommends that the SARA states develop and convene a recurring automotive workforce summit. The summit would serve to drive changes that would benefit the entire U.S. automotive industry, rather than giving a specific company or state a competitive advantage. The workforce issue has been identified as so central to the industry's problems that regional efforts are likely to be more successful if they are first guided by a national level picture. Taking this approach would then allow the SARA region to undertake its own initiatives (such as the other recommendations made in this section) that would then be highly competitive. Starting at a national level would ensure that any regional or local initiatives would have the buy-in of the entire industry. In fact, workforce concerns are a problem central to all manufacturing industries, and addressing them would help the region better support and attract manufacturers from myriad sectors of the economy.

The summit would bring together automotive industry leaders, as well as human resources executives, along with educators and representatives of multiple levels of government. It would likely be most successful as the premiere of the Regional Automotive Labor Needs Analysis recommended above. The summit would bring increased attention to needs and solutions, as well as sending a clear message to industry that the region is taking steps to address workforce shortages. Using this approach would give the participants specific initiatives to analyze and implement.

Supply Chain Density Recommendations

Because of automakers' and suppliers' desire not to compete with other entities for workers, the SARA region's automotive endowment is dispersed over a large geographic area and not as concentrated as the industry is in the Northern US. While this approach has provided benefits, such as less competition for local workforce, it has also had negative impact. As the automotive industry continues to place increasing emphasis on logistics costs, for example, a more dense automotive industry presence will grow in importance. In order to make the region more competitive in attracting and retaining automotive investment, CAR recommends the following supply chain density initiatives:

1: Automotive Supplier “Magnet” Plant Analysis

CAR recommends that SARA region states undertake an analysis to investigate which categories of product produced by automotive suppliers present them with the best opportunity to attract additional investment. Specifically, the analysis would focus on two areas of research. The first is to determine which components and systems must be sourced from facilities located close to the assembly plant to which they are sourced. The drivers for such demands include component weight, fragility, packaging cost and difficulty, and need for just-in-time sourcing. The second research area would determine which vehicle components and systems require additional sourcing from suppliers in the region. Complex components, such as instrument panels and corner modules, contain subcomponents from a variety of lower tier suppliers. The region in which the investment is located would therefore be in a better position to recruit not only the tier 1 supplier producing the systems, but also the necessary lower tier firms.

2: Automotive Supplier “Clustering” Initiatives

The scrutiny placed by both automakers and suppliers on logistics and shipping costs has come to play an increasingly critical role in investment and expansion decisions. Likewise, the focus on inventory reduction and just-in-time shipping to production facilities is likely to continue to drive investment to regions where a significant number of automotive suppliers are clustered together. As previously described, the SARA region does not have the automotive supply chain density that is found in the northern states. It is possible, however, to create areas of increased density in specific strategic locations throughout the region. CAR recommends the region undertake initiatives that result in more local clustering of automotive supplier facilities. These efforts can include the incentivizing of supply parks near specific automotive assembly plants. Likewise, regional supplier parks and transportation hubs, when strategically located, can supply multiple assembly plants. In addition to attracting automotive supplier manufacturing operations, initiatives that improve logistics and just-in-time shipping, such as targeted infrastructure improvements, can improve the attractiveness of a site or community to attract multiple automotive supplier investments and result in local and regional clustering.

3: Regional Tooling Initiative

Throughout the interviews performed for this study, the region’s lack of a robust tooling sector has been held out as an example of low supplier density. CAR has been in discussion with a number of groups interested in executing a more regional tooling strategy. With the support of the SARA region, the next step would be to organize an exploratory event focused on the region, rather than individual state efforts to attract auto industry investment. The purpose of the exercise would be to identify a pathway to establish a stronger tool and die presence in the region. The pathway would likely include:

- Competitive assessment and requirements
- Launch efforts (funding, business planning, location determination, etc.)
- Scope of services
- Tool and die apprenticeship program development
- Strategy to develop engineering relationships with customers

CAR recommends an initial survey of possible service demands by manufacturers and fabricators to identify market potential, and then hosting a roundtable discussion with tool shop owners who may be interested in locating a facility. A final draft document outlining the market potential and challenges can then be distributed to the different states.

Research & Development Recommendations:

Basic research takes place largely at companies' global headquarters with significant development at regional manufacturing sites. The region boasts world-class universities and several government labs that can be assets to automakers and suppliers struggling to meet fuel economy, safety regulations, and consumer demand for more sophisticated vehicles and components. Mexico is also focusing heavily on developing R&D capabilities. Companies indicated in interviews with CAR that their corporate parents both in North America and overseas are running short on global R&D capacity and are therefore more dependent on regional facilities to take on additional development responsibility. New clusters are developing based on expertise and infrastructure and this is where a regional effort can offer the most opportunity.

1: Implement a Regional R&D Support and Attraction Initiative

In order to benefit from the growing decentralization of R&D activities, as well as to better compete with Mexico's growing R&D capabilities, CAR recommends that the SARA region states collaborate on the following activities:

- Promote an entrepreneurial environment, drive commercialization, and connect incubators with business and academia.
- Support collaboration initiatives, for example: NIST Manufacturing Extension Partnership (MEP) and the EDA Investing in Manufacturing Communities Partnership (IMCP).
- Engage NIST Manufacturing Technology Acceleration Centers (MTAC).
- Support and develop additional incubation and entrepreneurial assistance programs for small suppliers.
- Identify pre-competitive collaborative technology research and possible federal support.

2: Promote Co-Engineering Initiatives between Industry, Educational Institutions, and Federal Laboratories

Private industry basic research has traditionally been performed at facilities in or near a firm's headquarters. Because the majority of automakers and suppliers located in the SARA region are not headquartered there, this has limited the amount of basic research performed in the region. In order to benefit from more basic research activity, CAR recommends that SARA region states leverage their educational institutions, as well as the Federal laboratories located in the region, to perform more research jointly with automakers and suppliers.

Several such initiatives, such as those at the Clemson University International Center for Automotive Research (CU-ICAR) or the Oak Ridge National Laboratories, already exist in the region and have proven

records of success. Additional support and regional coordination of these initiatives will help other institutions in the region benefit from the high-paying jobs provided by this activity, while also making the region a more attractive investment option.

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Accelerating the Growth of the U.S. Automotive Manufacturing Industry at Home, Rather than Abroad

What does industry need to increase investment in the Southeast Region?

REPORT DETAIL AND BACKGROUND

November 2014

Introduction

A vibrant and growing auto industry is driven by investment and employment growth, resulting in a greater density in the U.S. supply chain. Many international manufacturers have aggressive localization objectives designed to expand regional supply chains. In the automotive south, supply chain expansion is often impeded by barriers common throughout the region; indicating an opportunity to identify synergistic opportunities for the region. This CAR research initiative examines the critical success factors necessary for continued global automotive investment growth within the southern U.S. automotive manufacturing region.

Through the support of key automotive states and regional interests, this Southern Automotive Research Alliance study seeks to address the common challenges and identify actionable recommendations aimed at supporting states as they strategize collaborative efforts to attract new automotive investment and create more automotive employment in the United States.

The states funding the effort include Alabama, Kentucky, Louisiana, Mississippi, South Carolina, and Tennessee.

Purpose of Study and Methodology

The SARA study was commissioned by the southern automotive states to help inform the region about the needs and problems faced by the automotive industry stakeholders in the region, and to capture and analyze this “voice of the industry” perspective into possible actionable recommendations to help improve the region’s competitiveness to support, retain, and attract automotive investment and to grow U.S. employment.

In order to provide a robust view of the region’s automotive environment, CAR conducted more than 40 interviews with key industry stakeholders. CAR’s interviewees included representatives at ten automaker facilities, as well as dozens of automotive suppliers, educational institutions, and other regional influencers. The results of these interviews were then combined with a comprehensive literature search, as well as input from CAR staff subject matter experts, to produce a set of recommendations intended to help improve the region’s competitiveness through the implementation of collaborative efforts with regional scope.

A New Era of the Southern Automotive Industry - A Time of both Opportunity and a Need to Take Action

Following decades of expansion, the growth of the automotive industry in the SARA region has leveled off. CAR forecasts call for mild growth in vehicle production volumes and for employment to level off over the coming years. Since the last assembly plant in the region was announced in 2009, every subsequent automotive assembly plant announcement has gone to Mexico. While no region in the country can be ruled out as a potential site of a future automotive assembly plant, the pursuit of these facilities can no longer be at the forefront of the region’s economic development strategies. As is the case in the northern States, the SARA region therefore now competes largely for expansion of automakers’ existing facilities in the region, as well as additional automotive supplier investment.

In this environment, regional collaboration, strong relationships with companies, and an awareness of industry trends and developments are more important than ever. Because the SARA region finds itself in a new automotive era, it needs new strategies to help it compete. The recommendations provided in this study are intended to provide a framework for how the region can adapt to its new environment – and how it can position itself to again experience an expansion of its automotive endowment.

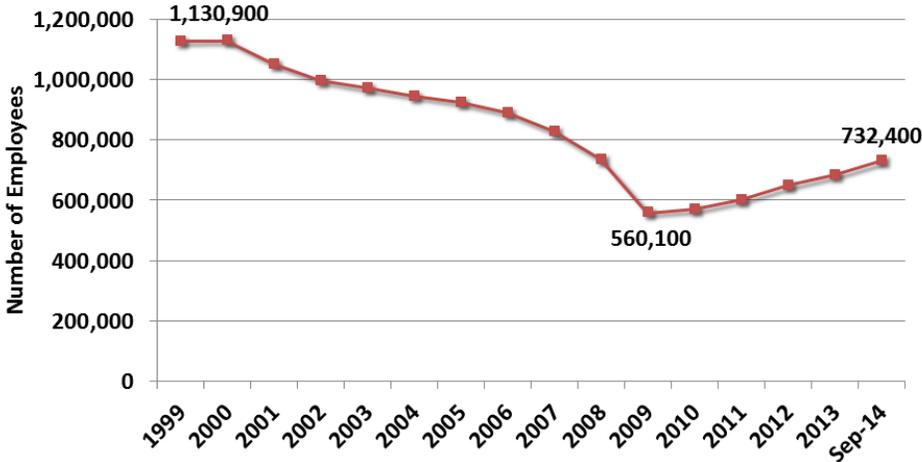
Regional Competitive Analysis

The automotive industry, both at a national level and within the SARA region, is in a period of recovery from the most recent economic crisis, which began in 2008. Although the industry has expanded since seeing production and employment bottom out in 2009, employment levels have not returned to previous peak levels. This section will discuss the status of the industry both nationally and within the SARA region.

U.S. Automotive Industry Status

Chart 1 provides U.S. automotive employment for automakers and suppliers from 1999 through September 2014. Total U.S. automotive employment stood at 732,400 in September 2014, an increase of over 170,000 since employment hit its trough in 2009. Despite the addition of these jobs, employment levels have not returned to those seen in 2008 or the peaks of earlier years when U.S. automotive employment exceeded one million jobs.

Chart 1: Motor Vehicle & Parts Manufacturing Employment 1999 – September 2014



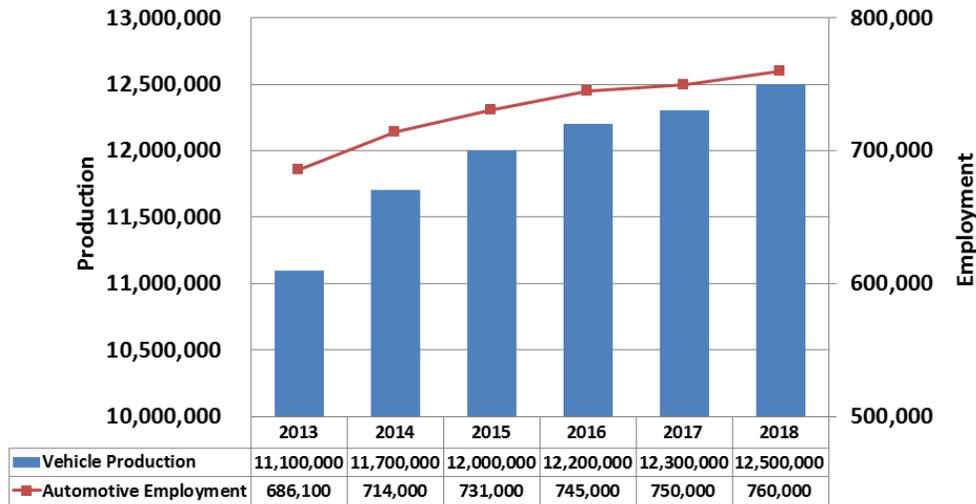
Source: BLS, U.S. DOL

Between 2009 and 2014, U.S. light vehicle production nearly doubled from 5.8 million to 11.7 million units. Over the same time period, U.S. automotive employment grew by only 30.8%. Increased productivity, elimination of excess capacity, and the sourcing of vehicles and components from other countries are the key reasons for this outcome.

Chart 2 provides CAR’s forecast of both U.S. light vehicle production and employment. U.S. automotive production is forecast to reach a level of 12.5 million units by 2018, while employment (combined automaker and supplier) is forecast to reach 760,000. The U.S. vehicle market has historically been cyclical, rarely experiencing more than five years of sustained growth without undergoing a contraction. Even though the current recovery is in its fifth year (having begun in 2010), no contraction is expected in the forecast window. Vehicle sales, production, and employment are expected to continue to gradually increase. For the automotive industry, the implications of this sustained growth are that the capacity

and workforce constraints the industry is currently facing will only grow worse. Efforts intended to benefit from the industry’s growth (e.g., SARA) are important to automakers, suppliers, and the communities that host their facilities and provide their workforce.

Chart 2: U.S. Vehicle Production & Employment Forecast, 2013-2018

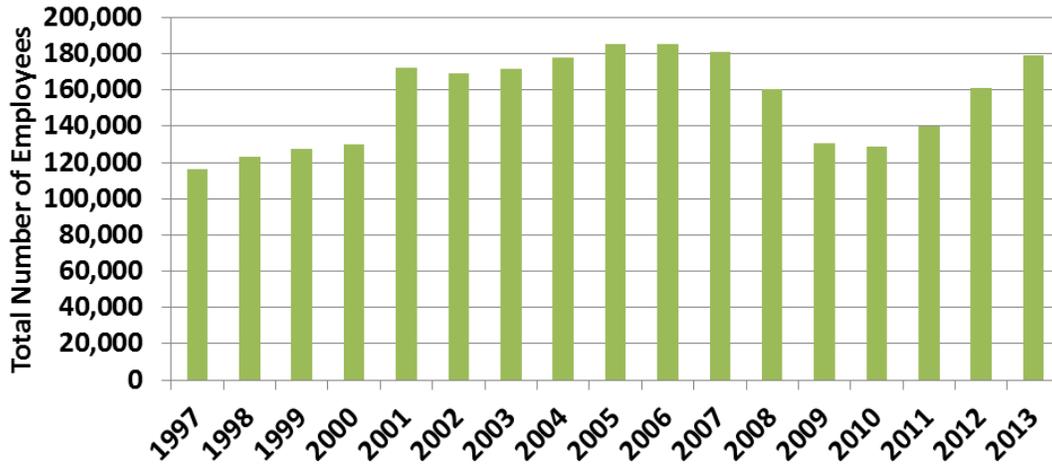


Source: Automotive News; CAR Research; BLS, October 2014

SARA Region Status

Chart 3 shows total SARA region automotive employment (automakers and suppliers) from 1997 through 2013. Following a period of growth, employment fell steeply in 2008 and 2009, while industrial output dropped nationwide. As automotive sales and production have recovered, the region has regained a majority of the employment lost. It is noteworthy to point out, however, that total 2013 employment in the region has still not matched the levels seen from 2005 through 2007, despite several new assembly plants, as well as accompanying supplier investments, in recent years. While this dynamic parallels the trends in national employment, the SARA region is much closer to returning to peak employment levels than the U.S. automotive industry as a whole.

Chart 3: SARA Region Total Automotive Employment, 1997-2013

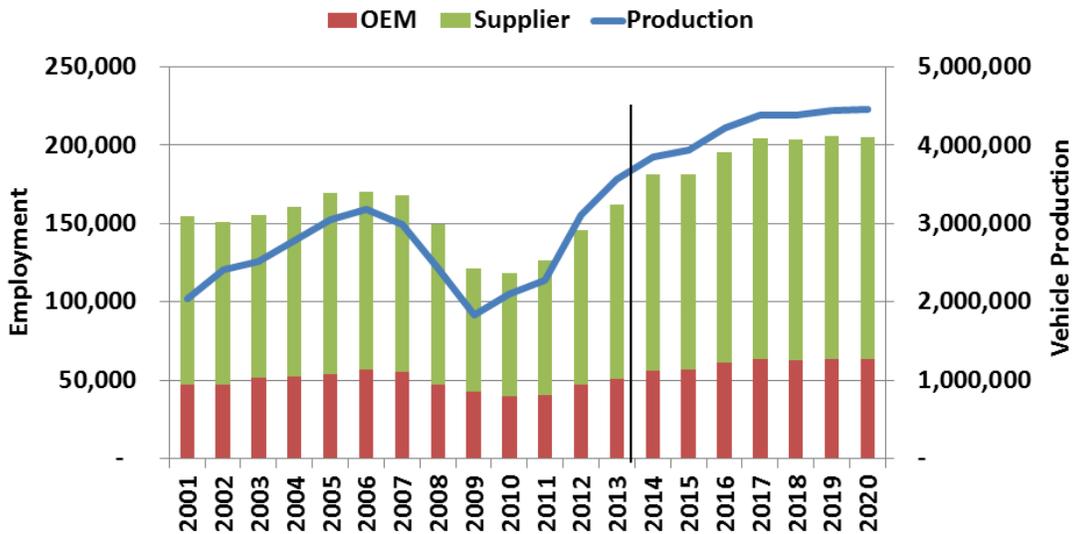


*Motor Vehicle Manufacturing Employment for Louisiana not provided by source from 1997-2000

Source: BLS-Quarterly Census of Employment and Wages, CAR Research

Chart 4 provides both a history and a CAR forecast of automotive production and employment in the SARA region. While vehicle production levels hit a new peak of nearly 3.6 million units in 2013, automotive employment doesn't recover to previous highs until 2014. Both vehicle production and employment are forecast to continue gradually increasing. Despite production volume increases, automotive employment in the region is forecast to level off at just over 200,000 beginning in 2017.

Chart 4: SARA Region Vehicle Production and Employment Forecast



Source: CAR Research; LMC-Automotive ; BLS

SARA Region Automaker Employment

Chart 5 shows SARA motor vehicle production (automaker) employment from 1997 through 2013. After peaking at nearly 61,000 in 2006, the region's automaker employment dropped to a low of just over 41,000 in 2010. As is the case nationwide, employment has since recovered but has not returned to peak levels. The region's 2013 automaker employment stood at 56,200, about 6,000 less than at the peak in 2006. Even though the region's total vehicle production is at all-time high levels, and despite the fact that three new assembly plants, as well as other automaker-operated facilities, have opened in the region since 2009, motor vehicle production employment has not fully recovered. As is the case nationwide, the region's automakers are benefitting from increased productivity and elimination of excess capacity.

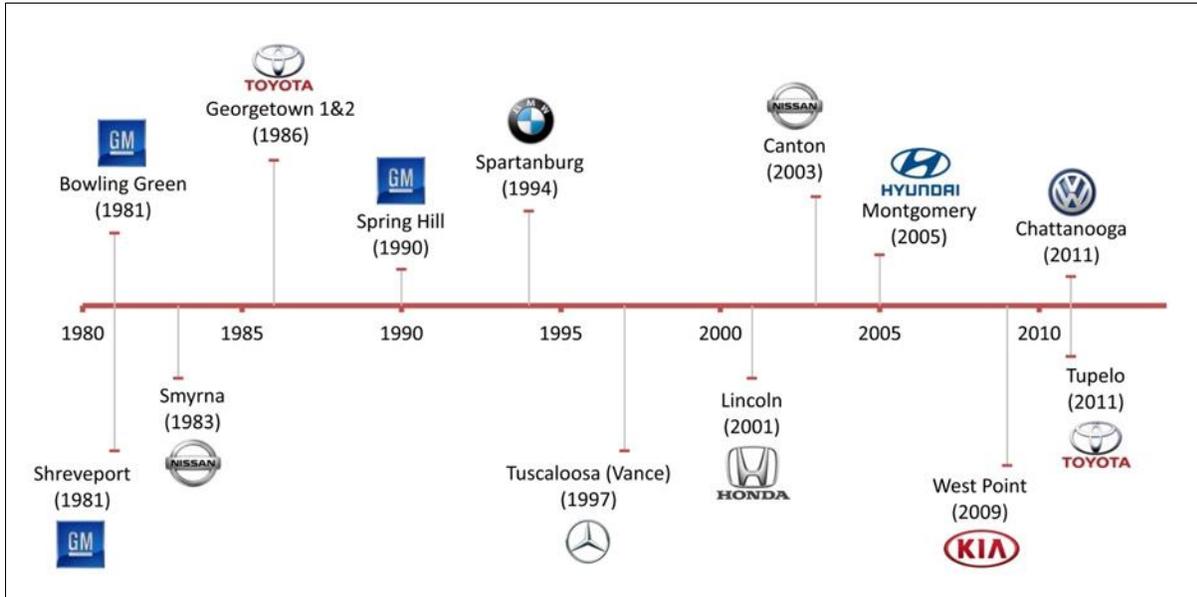
Chart 5: SARA Region Motor Vehicle Manufacturing Employment, 1997-2013



Source: BLS-Quarterly Census of Employment and Wages, CAR Research

Chart 6 shows new vehicle assembly plants that have opened in the region since 1980. Following a steady wave of growth over three decades, no new assembly plants have come online since 2011. Given that the last assembly plant announcement took place in 2009, the region has now gone five years without a new assembly plant announcement. Likewise, no assembly plant announcements have taken place in the rest of the United States, or Canada, during this time. Since 2009, however, there has been a wave of announcements of assembly plants and other facilities in Mexico, which has emerged as a key competitor of the region in pursuing both automaker and supplier investment.

Chart 6: New Assembly Plants in the SARA Region 1980 – 2014

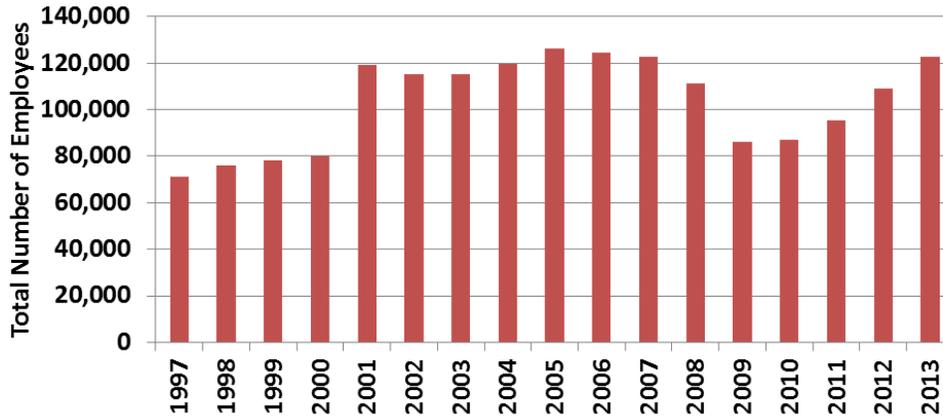


Source: Center for Automotive Research: Book of Deals

SARA Region Automotive Supplier Employment

Chart 7 shows automotive supplier employment in the SARA region from 1997 through 2013. Regional supplier employment peaked in 2005 at a level of just over 124,000. Following a strong contraction that bottomed out in 2009 at a level of just over 86,000 jobs, the region’s supplier employment has made a strong comeback, reaching nearly 123,000 in 2013. Unlike automaker employment, the region’s supplier employment has returned to nearly peak levels, with 2013 employment only about 1,700 below the peak in 2005. The region can therefore be said to have been slightly more successful in competing with Mexico and other regions in attracting and retaining automotive suppliers.

Chart 7: SARA Region Motor Vehicle Parts Manufacturing Employment, 1997-2013

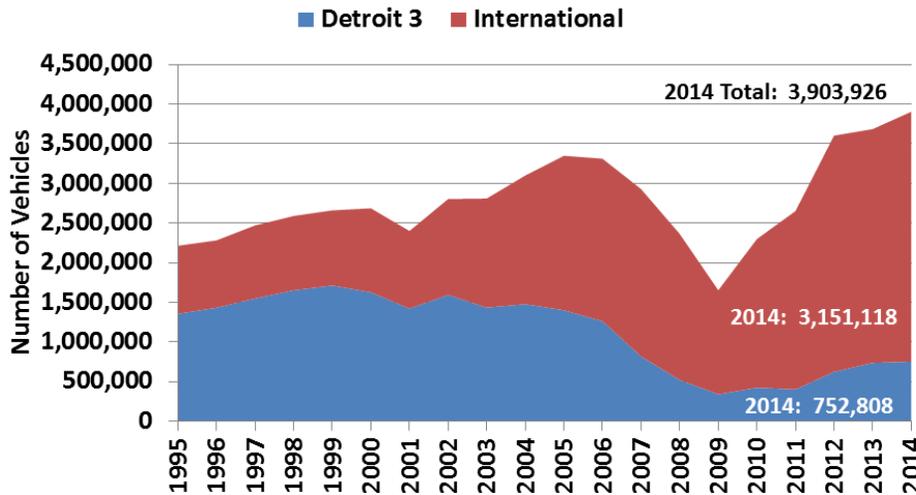


Source: BLS-Quarterly Census of Employment and Wages, CAR Research

SARA Region Vehicle Production

Chart 8 shows light vehicle production in the SARA region by the Detroit Three and international automakers. The region is forecast to produce 3.9 million vehicles in 2014, which is an all-time high. As recently as the early 2000's, the Detroit Three were responsible for a majority of the vehicle production in the region. The trend has been reversed; while the Detroit Three closed many of their southern facilities during the recent economic contraction, several international automakers added new assembly plants. As a result of these two dynamics, international automakers can be expected to account for the majority of the region's vehicle production going forward.

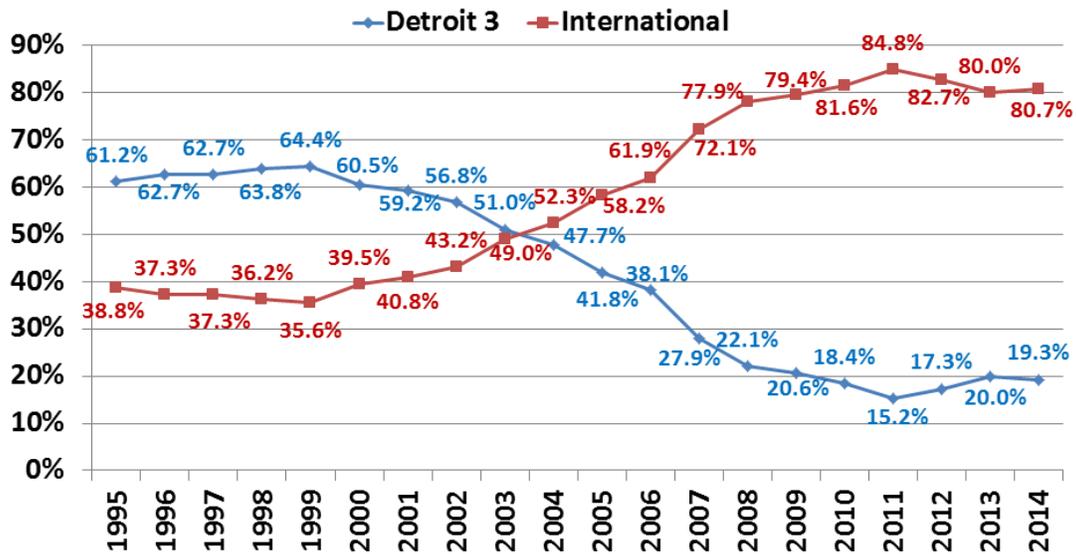
Chart 8: Detroit 3 vs. International SARA Region Vehicle Production, 1995-2013, 2014 Forecast



Source: IHS; LMC Automotive

Chart 9 shows the share of vehicle production in the SARA region for the Detroit Three and for international automakers. Beginning in 2004, international automakers have been responsible for a majority of the region's automotive output. In 2014, their share of the region's international vehicle production is forecast to reach nearly 81%. It is important to note that these percentages have stabilized. The distribution of production in the region in 2014 is expected to be nearly identical to 2008 levels. Given that automotive analysts nearly unanimously expect Detroit Three market share to remain stable in the forecastable future, and that since 2009 all new assembly plant announcements have been won by Mexico, this trend can be expected to remain in effect.

Chart 9: Detroit 3 and International Shares of SARA Region Vehicle Production, 1995-2013, 2014 Forecast



Source: IHS; LMC Automotive

SARA Region Automotive Investment

Chart 10 shows automotive investment announcements by automakers and suppliers in the SARA region from 2009 through 2013. During this five-year period, the total value of the announced investments was \$19.3 billion. Three of the region's states (Kentucky, Tennessee, and South Carolina) attracted more than \$4 billion each during this time period. Mississippi and Louisiana experienced the smallest share of the announcements. Both states received automotive investment of less than \$0.5 billion each over the five years analyzed.

Chart 10: Announced Automaker and Major Supplier Investment, 2009-2013



Source: Center for Automotive Research: Book of Deals

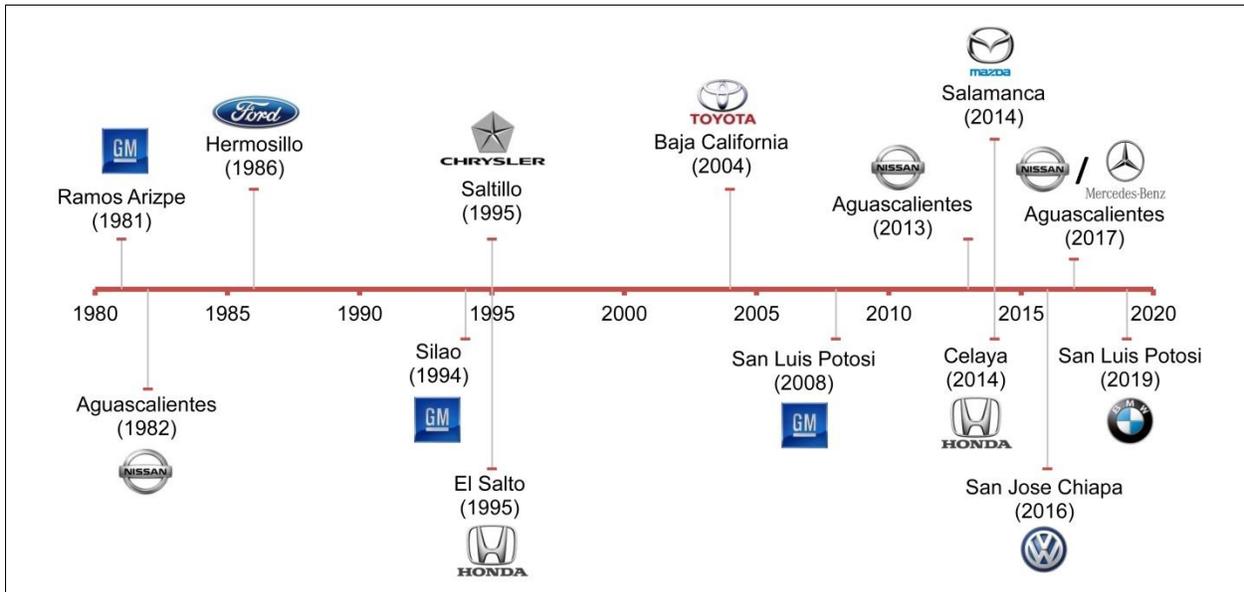
The Emergence of Mexico as the SARA Region's Key Competitor

According to CAR's Book of Deals database, Mexico attracted \$1.5 billion in automotive investments in 2013 – three times more than the \$0.5 billion that was invested in the SARA region for that year. In addition to manufacturing, both automakers and suppliers report increasing reliance on Mexico for engineering as well. Mexico is therefore emerging as a key competitor not just for manufacturing jobs but also for the high-paying white collar jobs provided by R&D operations.

In addition to low cost labor, a key reason for Mexico's success in attracting automotive investment is its many free trade agreements with countries around the world. Mexico has Free Trade Agreements (FTAs) with over 40 countries, and roughly 70% of the world's Gross Domestic Product (GDP) can be accessed tariff-free from Mexico. No other country in the world boasts an equivalent export environment. With easy access to both the Atlantic and Pacific oceans, Mexico's access to global markets has been a powerful tool in attracting automotive investment. This is particularly true for automakers such as BMW and Audi, which specifically plan for their Mexico operations to be global export hubs for the vehicles produced there.

Chart 11 shows new assembly plants announced in Mexico beginning in 1980. The pace of new facility openings was steady but slow during the first two decades covered. During this time, however, international automakers were aggressively opening new facilities in the Southern United States. The dynamic reversed during the Great Recession. Since 2009, no new assembly plants have been announced in the United States or Canada. In Mexico, however, six new assembly plants were announced between 2009 and 2014. According to research performed by CAR, these new announcements represented over \$8 billion in investments by automakers. Together, automakers and suppliers invested about \$15.1 billion in Mexico during this time period.

Chart 11: New Assembly Plants in Mexico, 1980-2020

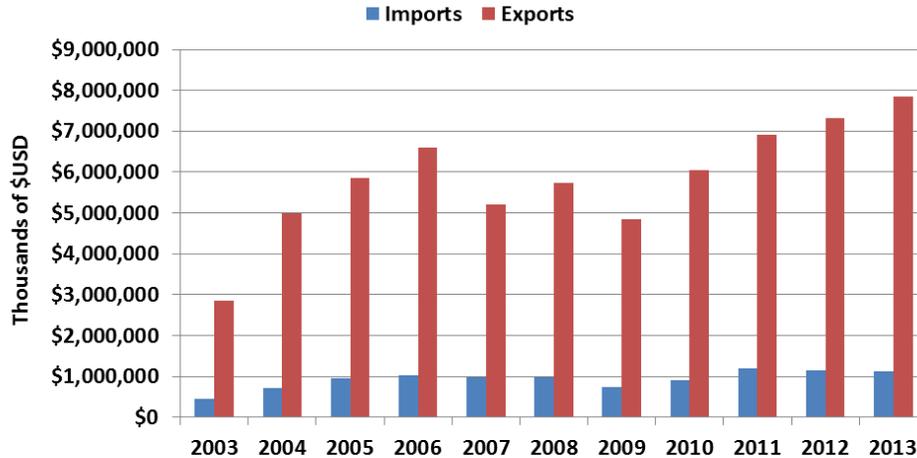


Source: Center for Automotive Research: Book of Deals

Largely as a result of the combined effect of the North American Free Trade Agreement (NAFTA) and lower manufacturing costs, the United States has a significant trade deficit with Mexico in shipments of vehicles and many automotive commodities. This dynamic is true for vehicles, as well as most vehicle components. Certain more sophisticated products, however, are still not sufficiently available in Mexico. This is particularly true for select electronics, as well as raw materials.

Chart 12 illustrates the U.S. trade surplus with Mexico in the trade of plastics. In 2013, US imports of plastics from Mexico were just over \$1 billion, while exports to Mexico were nearly \$8 billion, resulting in a trade surplus of nearly \$7 billion. The US enjoys similar trade surpluses in the trade of steel, aluminum, and other materials. The ready availability of these materials in the United States provides US economic developers an opportunity to highlight this benefit, particularly in the manufacturing of products which require large amounts of these materials. This aspect is likely to grow in importance as automakers and suppliers place further scrutiny on their logistics costs.

Chart 12: U.S. Import/Export Value with Mexico—Plastics



Source: U.S. Census Bureau—Foreign Trade Statistics

There are many well-publicized challenges to running manufacturing operations in Mexico. These include crime, government corruption, an inefficient judicial system, high employee turnover, insufficient construction financing, and others. Emphasizing the degree to which these issues are smaller problems in the US currently provides American economic developers with advantages they can point to in their own communities. It is important, however, not to assume these advantages will always exist. The Mexican government has actively been engaging in programs to alleviate these problems and therefore reduce the degree to which they deter investment.

The competitive threat posed by Mexico provides a key motivator for the SARA region states to embark on new, collaborative initiatives such as those offered in the Recommendations section of this study. Given that the states can only exert a mild influence in compelling the U.S. federal government to improve the export position of the United States in order to compete with Mexico’s trade environment, engaging in these initiatives is particularly critical to win new investment through regional collaboration.

The recommendations provided in this study focus on regional initiatives to be undertaken jointly by the states working together. This approach, in addition to its other benefits, is also appropriate when competing with Mexico for investment. In Mexico, a company considering making an investment often works with a representative of the Mexican federal government who can coordinate with local and federal government officials and regulatory agencies. In contrast, if considering investment in the United States, the company would have to approach each individual state independently, and then have to work with multiple levels of public officials and regulators within each state. The considerable increase in complexity and workload is a key reason for CAR’s recommendation of a series of steps leading to a single point of contact for companies considering investment in the SARA region.

Technology Is a Driver of Automotive Critical Mass

The global auto industry is experiencing a period of accelerated technology development and deployment driven by competitiveness and regulations for improving safety, fuel economy and

emissions. While traditional basic research has always been centered near automaker headquarters, the relentless pressure to develop and implement technology today is greater than ever before, and research resources are universally in short supply. Also, as new technology gets deployed at a faster cadence in manufacturing, these facilities, especially in satellite locations, have greater demand for new process development. Manufacturers are seeking both research (often at the Ph.D. level) and development (typically at the engineering level) support more aggressively today than in the past. The global shortage of research and development support places a premium value on regions that can provide help in this regard. Leading technology opportunities include:

- Advanced internal combustion engine
- Transmission
- Vehicle electrification (hybrids and battery electronics)
- Advanced lightweight materials, engineering design (CAE) and joining
- Connected and autonomous vehicles
- Manufacturing robotics and automation
- Information technology



Attraction and Business Environment

Automakers and suppliers engage in a rigorous process of communication and analysis when they consider future investment decisions. The communities that stand the greatest chance of attracting these investments are those that not only offer the most competitive incentive package but those that also streamline, centralize and optimize their engagement with companies. The dozens of interviews performed as part of this study revealed that companies have strong preferences for the types of communities they prefer to invest in, as well as their overall relationships with government officials and economic developers.

The Site Selection Process

While each of the companies interviewed had a unique approach to the site selection process, several commonalities exist across all of the interviewees. The decision process typically takes between six months to a year. Depending on the size and complexity of the project, as well as the necessary automation, a facility generally starts operation about two years after the decision process begins.

The site selection process begins with a trigger necessitating a new facility. The trigger can be either overall growth in output volumes, expansion into a new product area, or the award of new work by a customer, among other factors. Decisions are typically made at the corporate level, either at the facility's North American headquarters or, in the case of international companies, at the global headquarters based on recommended options from North American executives. Larger companies with several divisions may have different investment decision processes at each division.

The factors considered are both regional and local in nature. Regional factors, such as transportation costs, customer and supplier locations, and availability of an adequate workforce dictate more broadly where a facility location is desired. Local factors, such as site access, utility costs, and incentive packages then help the company choose between specific locations. In order to track and score these factors, companies typically have a matrix, spreadsheet, or other tool in which the information sought and received from the communities is tracked.

"We use a matrix with a very detailed set of criteria in a formal, structured process."

- Director of Local Government Relations, Automaker

In addition to tracking local factors, such tools also typically track costs of construction, launch, operation, utilities, and transportation. The communities considered are typically also rated on more qualitative factors, such as quality of life, crime levels, and others. Because bids from different communities are not standardized, companies go through an intense process to make the various locations considered easier to compare to each other.

Once a company is satisfied that it has received the necessary information from each community considered, and that it has properly assessed all of the bids to fully understand their total cost and benefit over time, the investment decision is typically made at a meeting of senior regional or global

executives after they have received recommendations from myriad company departments which would be impacted by the decision, such as manufacturing, operations, facilities management, human resources, legal staff, and policy staff. It is important to note that, in many cases, the decision is made by executives who have not analyzed the proposals sent by each community. Rather, they are guided by a complex matrix or spreadsheet summarizing data on quantitative and financial decision factors, as well as ratings of qualitative decision factors. Plant managers, even though they are intimately familiar with the communities in which they operate facilities, typically have little influence on investment decisions.

“Sometimes, local economic developers try to speak with the plant managers, and then they are speaking with the wrong person in our company (regarding investment decisions).”

- Director of State Government Relations, Automaker

In some cases, it is necessary to seek additional information from the candidate communities if no clear winner emerges.

Factors and Community Characteristics that Drive the Investment Decision Process

One factor most commonly listed by interviewees as critical to site selection was availability of an adequate workforce within driving distance of the investment site under consideration. As the key driver of expansion and new investment decisions, workforce availability was cited by the interviewees as the one critical site selection factor – it is almost impossible to compensate for lack of an adequate workforce by being competitive in other areas of the investment decision process. Workforce availability, and its impact on investment decisions, is discussed in detail in the section titled “Workforce”.

Particularly for investments that originate with an award of new work by a customer, proximity of the locations considered to the customer’s plant will be important. Other factors included adequate and flexible incentive packages, local tax rates and regulatory environment, as well as proximity of community and technical colleges and other educational institutions.

Incentive Packages

Incentive packages factor into an investment decision process in several different ways. If a proposed site has a key deficiency, such as suboptimal highway access or significant distance to an adequate workforce pool, a larger incentive package serves as remedial compensation. In this sense, an incentive package is not likely to be a differentiator (unless it offers substantially more generous terms than the competing packages) but rather to serve to keep a community in the running for attracting a particular investment. In other cases, incentive packages are scrutinized to help a company choose between two or more sites that are similarly appealing to the company. In this case, the incentive package can serve as the differentiator that compels a company to select a given community. The dollar size of the incentives offered, however, is not the only characteristic scrutinized by potential investors.

“Incentive size doesn’t often sway the equation. It is rare to find another state offering more. Everyone offers incentives.”

- Vice President, North American Operations, Supplier

In addition to the financial value of the incentives offered, companies also consider the potential uses of the incentives. Training incentives, for example, are more valuable if they can also be extended to incumbent workers and not just new hires – something interviewees noted is frequently lacking in the incentive packages they receive. Likewise, communities face a political problem in incentivizing automation purchases (such as robots) by existing companies if those purchases decrease the company’s workforce needs (or even if employment stays level). Even though the staff needed to operate the new tooling may have to be better educated – and better paid as a result – the political nature of job creation concerns makes such scenarios difficult for the community involved. It is partially as a result of the politically volatile discourse that surrounds job creation that many interviewees supported the recommendation of an apolitical one-stop shop for investment attraction.

“Economic development authorities would not listen [...] they would offer and show properties, sites that would not work at all. They would not understand exactly what our requirements are even if we sent them over. The main importance was to look from a technical perspective. We had many technical requirements that were very crucial and all the incentives in the world wouldn’t be sufficient if they would not fit in the project.”

- Vice President, North American Operations, Supplier

Interviewees stressed that, when evaluating incentive packages, their focus is on total cost over time. Even though they prefer incentives with grants or other financial benefit as early in the investment process as possible, their decision is ultimately more likely to be swayed by the total savings presented by each incentive package over the full time window covered. They therefore engage in calculations to make the total value over time of the incentive packages they are considering more directly comparable, as communities take different approaches in presenting the incentives they are willing to offer.

Many of the companies interviewed indicated that, in addition to size and timing of the incentives offered, it is important that incentive audits and monitoring be done in a manner that isn’t onerous on both the company and the community. They provided examples, such as facing several audits in the same year from different departments of state government, and payment delays lasting years even though the company was compliant and had provided the requested information. One interviewee stated that his company has walked away from incentives it was entitled to receive because the onerous

audits and other requests were too much of a burden to comply with, or some of the incentive demands were too difficult to comply with.

Several of the companies interviewed also indicated a desire for incentive package funding to come from both the state and the local community. If the local community has also made an investment, the perception is that local authorities are more supportive of the company's presence and are more likely to be responsive to future requests.

“The method of that funding coming back to us for the expansion, it does involve state money and local money [...] State and economic development professionals are used to spending money to make money; local governments typically just see the windfall, and they don't recognize the need for that reinvestment, and that's what this incentive package does. It truly provides partnership with the state and the local taxing authorities.”

- Manager, External Affairs, Automaker

Other Factors Considered

Many of the factors about which interviewees were questioned were described as important on their own terms but, because they are likely to be similar among the communities considered for investment, less likely to actually be a driver in investment decisions. These factors included local tax rates, the regulatory environment, and local political climate. If a community under consideration falls short in one of these characteristics, its chances of being selected will be lowered. Excelling in these characteristics, however, is not likely to provide a strategic advantage since they are often considered a given.

Most of the companies interviewed valued the proximity of educational institutions to the site being considered. While in some cases educational institutions were valuable as potential partners in research, they were mainly considered important as a source of potential workers and as a resource in training existing employees. The interviewees stressed the need for community colleges to have strong technical programs and for them to be willing to implement classes that meet the needs of local manufacturers.

Many of the companies interviewed stressed that an efficient and transparent permitting process was a key consideration. The companies stress that they are not seeking out communities with lax environmental enforcement, as their facilities frequently exceed the environmental friendliness requirements of their communities. The characteristics they seek include responsiveness from officials involved in the permitting process and an alignment of local, county, and state regulations that eliminates needless red tape.

Utilities often play an important role in the site selection process. In addition to serving the community's utility needs, they frequently provide funding for local economic development efforts and

engage directly with companies that may be locating in the utility's service area. Utilities can further influence economic development by offering competitive rates. Utilities often serve as a point of contact with companies considering investment in an area, and can provide answers to a potential investor's technical questions better than local economic developers.

“The utilities in general speak our language. They are experts from a technical perspective that understand what the needs will be because they have other clients that do exactly the same [...] and that situation is different with the economic authorities, which don't have specialists for each and every industry.”

- Manager, Manufacturing, Supplier

The importance of utilities in the site selection process is more significant for facilities with energy-intensive operations. The more automated the facility, the more likely it is that a company will pay close attention to the local utility's cooperativeness and cost competitiveness. For those companies which indicated that utility costs were a major driver, the cost of electricity, as opposed to gas, water, sewer, etc., was often indicated as most critical.

The Relationship with the Community

The companies interviewed expressed a desire to locate in communities that value manufacturing and are willing to form relationships with the manufacturers in the area. The communities that prioritize office and other white collar investment over manufacturing are considered less desirable than those who do not. Demonstrating a support for manufacturing can include helping local companies identify and pursue incentives that they may not be aware of.

Company representatives expressed that they desire communities that are willing to be in regular contact with company management and will be able to address concerns that may surface. A business-minded attitude, along with prompt response times and a willingness to be flexible were considered highly desirable characteristics for both expansion of and reinvestment in existing facilities, as well as candidate communities where new investment is being considered. Companies indicated a desire for regular and frequent contact with their local economic developers on a permanent basis, not just when they are considering additional investment in the community.

Many of the companies interviewed for this study are based overseas. During the interview process, these representatives frequently indicated that they prioritize communities that go out of their way to improve quality of life for expatriates. These efforts can include the presence of foreign language schools, providing expatriates with assistance in finding housing and assimilating within the community, and ensuring that local government and utilities have staff able to communicate in the appropriate foreign language.

Workforce

General Conditions

Throughout conversations with industry stakeholders it became apparent that workforce issues were prevalent throughout the SARA region, and common themes evolved. CAR found that when framing the workforce discussion, industry could identify three distinct subsets of workforce needs: production workers, skilled/maintenance workers (generally those with an associates level degree), and those employed in white collar or engineering disciplines.

Industry interviews reveal that production positions are widely believed to be the least challenging for auto industry employers to fill. Generally, production positions require the least amount of “hard skills” and educational attainment. The region’s most acute workforce needs come in the area of multi-skilled maintenance personnel. Workers in this area handle day-to-day technological, set-up, and maintenance issues within the manufacturing environment. Employers expressed some concern about the attainment of white collar and/or engineering candidates, though this is not considered as critical of a challenge today.

Regional Market Conditions for Production Workforce

Production employees, those generally working on an assembly line or building products within a factory, make up the greatest number of positions related to the automotive industry in the SARA region. Investment attraction efforts to date have generally focused on the acquisition of major automaker or higher tier supplier employers. Manufacturing facilities of this nature typically employ hundreds or thousands of production workers on-site.

Production workers in the SARA region are generally in adequate supply. Relative to other areas of the workforce, applicants are readily available. Supply of production workforce applicants is geographically dependent, although not to the extent of skilled trades or professional workforce. Employers expressed to CAR researchers the desire to be the employer of choice in a particular area. Companies iterated the fact that they like to locate their facilities at a maximum reasonable distance from other large auto manufacturing facilities with the goal of being the most desirable employer in the area, allowing their organization the ability to draw on the best the local talent pool has to offer.

“When we decide on a facility location, we like to make sure we will be the marquee employer in the area”

-Major automotive supplier on new facility site selection

While this approach makes sense from the perspective of a single employer, it may have adverse effects for the success of the regional industry. Another of CAR’s findings for the SARA region focuses on industry density and clusters. Employers’ motivation to create a buffer between their facilities and those of other major automotive manufacturers in the area creates a natural lack of density and clustering. Intentionally avoiding density in an area makes it more challenging to address industry specific educational needs as well as foregoing other benefits of industry clustering.

Educational needs of entry level associates at SARA regional automotive manufacturing facilities are largely met by high school graduate-level curriculum. Employers have expressed the fact that there is more that could potentially be done in conjunction with secondary level educators to better prepare candidates for a career in manufacturing. Such suggestions include:

- Co-op programming to expose students to the manufacturing environment and gain industry specific skills.
- Collaboration with front-line educators to facilitate the instruction of specific skills such as metric measurement knowledge.
- Introductory course offerings in areas such as robotics and career development.

Where employers have expressed dissatisfaction with production staff, it has focused on the area of soft skills. This group of skills is embodied by personality traits, social graces, communication, language, personal habits, friendliness, and optimism. It involves successfully working with other people and dependability. Employers have identified a lack of focus on soft skills as a weakness that leads to high levels of turnover which then challenges SARA region automotive employers and imposes financial costs.

Another challenge that auto manufacturers encounter when recruiting production associates is the general impression students have of automotive manufacturing careers. Many view auto manufacturing as a low technology, dirty, and physically demanding career. To address this at a secondary education level, employers have suggested letting students, and even their parents, tour their facilities to help drive home the idea that yesterday's automotive manufacturing career does not look like the auto manufacturing career of the future. According to a recent study performed by the Detroit Regional Chamber about the auto industry by young people and their 'adult influencers', "Too few youth and the people who influence their career choices have a clear understanding of the exciting high-tech opportunities in the 21st century automotive industry. It's not a secret that misconceptions about the industry are hampering talent attraction efforts." The study found in general that the automotive industry is not viewed as a growth industry; only 9% of those adults surveyed would say that automotive is a growth industry. Furthermore, only 9% of youth surveyed who do not know anyone who works in the auto industry would consider an automotive-related career.¹

"We would like to start bringing in high school students to tour the facility, look and see what the future could look like"

-Tier 1 automotive supplier on student development

¹ Block, Dustin. "Auto Jobs Aren't Attractive to Young Adults, Survey Finds." Mlive.com, May 28, 2014. Accessed June 10, 2014.http://www.mlive.com/auto/index.ssf/2014/05/auto_jobs_arent_attractive_to.html

Regional Market Conditions for Skilled Manufacturing Workforce

The largest workforce concerns expressed by automotive manufacturers located within the SARA region were in the area of skilled/maintenance personnel. This contingent of the automotive workforce makes up a greater share of the workforce than in previous generations, and with technological innovation is becoming increasingly more important. A survey conducted by Accenture for a manufacturing skills study found that nationwide, 45% of manufacturing roles are skilled, meaning that the position in question requires 12-24 months of training and/or experience. Furthermore, Accenture found that 79% of survey respondents indicated that their shortage of qualified applicants for skilled positions was either severe or moderate, with 39% responding that the shortage is severe.² Similarly, the majority of those in the automotive industry in the SARA region said that skilled (particularly multi-skilled maintenance) workforce availability was an acute and significantly challenging issue.

Lack of qualified workers and the pipeline of skilled workers for the future growth of the automotive industry in the SARA region is a pressing issue which follows a national theme. Research shows that the United States is not producing enough skilled workers to meet future needs and suggests that by the year 2020, the United States will experience a shortage of 3 million skilled workers with associate's degrees or higher and of 5 million workers with technical certificates or credentials.³

Multi-skilled maintenance workers are skilled in many areas that are applicable to the day-to-day operations of an automotive manufacturing facility, such as pneumatics and hydraulics. The qualifications are met by a mechatronics curriculum available at some technical colleges, often in cooperation with manufacturers in an apprenticeship format. Mechatronics is described as a discipline including a combination of mechanical, electrical, telecommunications, control, and computer engineering.

Mechatronics apprenticeship programs offerings in the SARA region are not adequate to support the needs of the industry. This is especially true in rural areas and compounded by the region's geographic dispersion of automotive manufacturing. Some larger employers in the area have internal technical initiatives to train maintenance associates whom they can promote from within. Also, some OEM manufacturers and larger suppliers have partnered with local community or technical colleges to create their own mechatronics apprenticeship programs. This is not practical for smaller suppliers or those in rural areas.

² "Accenture 2014 Manufacturing Skills and Training Study: Out of Inventory, Skills Shortage Threatens Growth for US Manufacturing." Accessed May 29, 2014. <http://www.themanufacturinginstitute.org/Research/Skills-and-Training-Study/~media/70965D0C4A944329894C96E0316DF336.ashx>

³ Olinsky, Ben and Ayres, Sarah. "Training for Success: A Policy to Expand Apprenticeships in the United States." Accessed June 26, 2014. http://cdn.americanprogress.org/wp-content/uploads/2013/11/apprenticeship_report.pdf

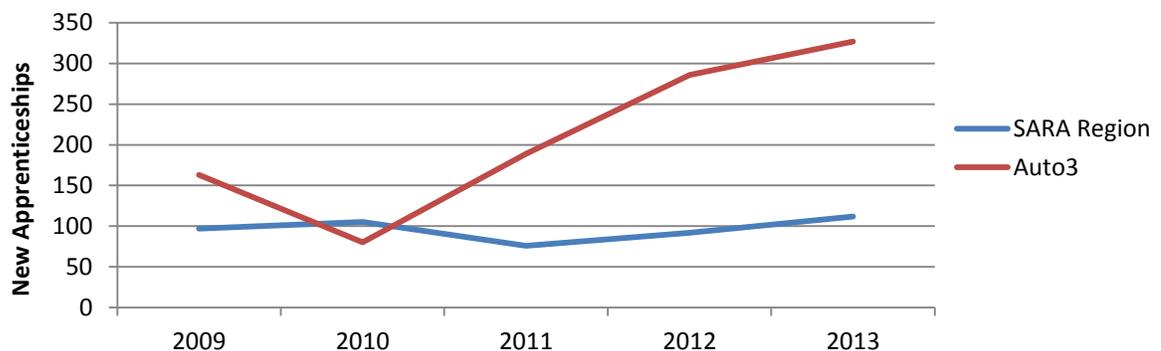
“We are lucky to have an internal technical training group...we like to promote from within to elevate our maintenance associates...we have an internal three year apprenticeship program.”

“We are growing so fast we have to hire maintenance associates from the outside too, and that is difficult, really difficult.”

-Tier 1 automotive supplier on maintenance associate training and hiring

Chart 13 and Chart 14 illustrate the difference between automotive apprenticeship activity in the SARA region and the three states of Indiana, Michigan, and Ohio (three states with a large automotive industry presence, as point of reference). According to the U.S. Census Bureau, as of 2013 the difference in populations between these two regions is less than 100,000 (.05%), so they are comparable on a per capita basis. In 2013, the northern region had nearly three times the number of individuals entering an automotive related apprenticeship.

Chart 13: Regional Comparison of New Automotive Apprentices

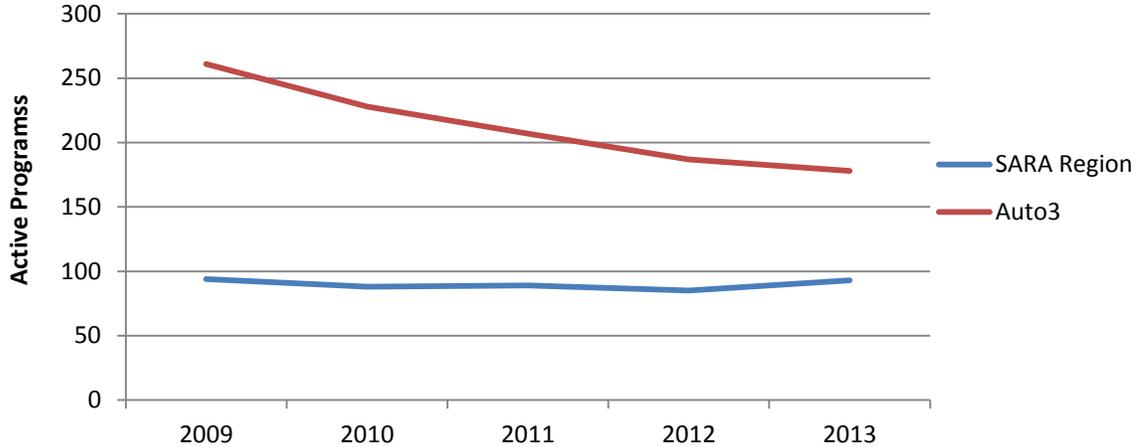


Source: USDOL Registered Apprenticeship National Results

Notes: Auto3 includes Indiana, Michigan, and Ohio; Fiscal years ending third quarter; Includes NAICS codes 3361, 3362, and 3363.

Although the trend illustrated on Chart 14 below shows that the northern region also had a decreasing number of active automotive-related apprenticeship programs, it still had nearly twice as many active programs.

Chart 14: Regional Comparison of Active Automotive Apprenticeship Programs



Source: USDOL Registered Apprenticeship National Results
Notes: Auto3 includes Indiana, Michigan, and Ohio; Fiscal years ending third quarter; Includes NAICS codes 3361, 3362, and 3363.

German companies, by comparison, use apprenticeships as a structured means to train their skilled associates often and effectively. More than half of all German students receive a technical or vocational education that includes as much hands-on work experience as it does classroom time. The model benefits both the company, which is able to hire the highly specialized worker, and the apprentice, who gains a job directly after graduation. Economists attribute the resiliency of the German economy and the strength of its manufacturing base in part to the system of vocational education.⁴ German companies in the SARA region, including BMW, Daimler, and Volkswagen, have successfully implemented apprenticeship programs in cooperation with local community and technical colleges. Just outside the SARA region, in North Carolina, Siemens recently began an apprenticeship program in cooperation with a local technical college. Upon graduation, workers will have an associate's degree in mechatronics and become employees with an average starting salary higher than that of the average liberal arts graduate from a four-year college.⁵

While some companies have successfully begun German-style apprenticeship programs, they are not adequate to meet the needs of the region's automotive industry. Beyond the foreign manufacturers benefiting from their proprietary programs, there exists a need for workers with similar training in both domestic and foreign businesses at the OEM level, as well as at lower tiers of the industry which employ the vast majority of the workers in the region.

^{4,5} Olinsky, Ben and Ayres, Sarah. "Training for Success: A Policy to Expand Apprenticeships in the United States." Accessed June 26, 2014. http://cdn.americanprogress.org/wp-content/uploads/2013/11/apprenticeship_report.pdf

Best Practice: Volkswagen Academy

The Volkswagen Academy, a partnership between Chattanooga State Community College's Engineering Technology Division and the Volkswagen Group of America, along with Tennessee Technology Center, Tennessee Technological University, and the University of Tennessee at Chattanooga, has designed two mechatronic programs specifically for the automotive industry. The two three-year programs, the Automation Mechatronics Program and the Car Mechatronics Program, are based on German curriculum and Volkswagen global standards. Both programs combine five semesters of academic and practical training, along with four semesters of paid, on-the-job training. Students study electricity, electronics, machining, welding, mechanics, robotics, automation, and integrated systems, at Volkswagen's on-site 163,000 square-foot training facility with high-tech classrooms that feature all the aspects of the manufacturing facility on a smaller scale to allow for hands-on training, while on-the-job training is completed at Volkswagen's Chattanooga, Tennessee assembly plant. During the on-the-job training component of the program, students receive an hourly starting wage of \$10 per hour for their first semester, with pay increasing throughout the subsequent semesters. Upon completion of the program, students receive an Associate of Applied Science degree in Systems Engineering Technology with a concentration in Mechatronics Systems from Chattanooga State Community College, and an Industrial Mechatronics certification from Volkswagen Chattanooga. Graduates of the program may be offered employment within the Volkswagen facility in the production or maintenance departments. Graduates will be qualified to work in manufacturing production facilities that emphasize lean production methods. Entry to the program, however, is contingent on a competitive application and interview process. Only 12 students are admitted into both the AMP and CMP programs each fall.

Preventative maintenance performed by associates promotes smooth daily operations and prevents downtime, which can be extremely costly. A study based on a survey of 300 executives from U.S. manufacturing companies with average annual revenues of \$100 million, conducted between August 2013 and January 2014, suggests that costs of increased downtime, increased cycle times, and increased overtime, all due to skilled labor shortages, can be significant. An estimate of costs based on the survey suggests skilled labor shortages will cost \$4.6 million each year for a company with \$500 million revenue.⁶

⁶ "Accenture 2014 Manufacturing Skills and Training Study: Out of Inventory, Skills Shortage Threatens Growth for US Manufacturing." Accessed May 29, 2014. <http://www.themanufacturinginstitute.org/Research/Skills-and-Training-Study/~media/70965D0C4A944329894C96E0316DF336.ashx>

Regional Market Conditions for Engineering and Professional Workforce

SARA region automotive employers are generally satisfied with their ability to find and retain talent in the fields of engineering, management, and administration. Most research and development takes place outside of the region, often in the Midwest or internationally. Most engineering positions are manufacturing engineering jobs dealing with day-to-day manufacturing operations support.

The results of CAR interviews suggest there are adequate educational resources locally to provide this contingent of the workforce. Concerns expressed by study participants were that new workers graduating from universities had little or no practical experience and that their educational preparation was based too much in theory. It was suggested that colleges and universities could focus more on providing opportunities for all students to have internship or co-op opportunities in their fields before graduation to better prepare them for their careers. Employers also expressed the desire to see engineers trained with a less traditional program curriculum to better meet their companies' needs. Employers told CAR researchers that while electrical, mechanical, and industrial engineers are valuable, they would like to see multi-skilled engineers with a broad range of skills, rather than in-depth knowledge of only one specialty.

“What we would like to do in the future is encourage academia to educate multidisciplinary engineers.”

“My recommendation is to give any engineer that goes through a university some sort of co-op schedule in their education that is tied to whatever their degree is.”

-Tier 1 automotive supplier on engineering education

Quality of life and location desirability were also identified as important for attracting engineering and professional staff to the region's automotive employers. Unlike production staff, and to a lesser extent skilled/maintenance staff, candidates for these positions will often relocate for an employment opportunity. For these employees (those with high levels of education), local characteristics such as primary and secondary education are often concerns. CAR found that factors like quality of the educational system for employees' families and local cultural opportunities are fundamental considerations. Most candidates will be reluctant to relocate to a new area, rural or urban, if they consider the school system to be of low quality. These areas play a role in site selection by automotive companies when considering investments.

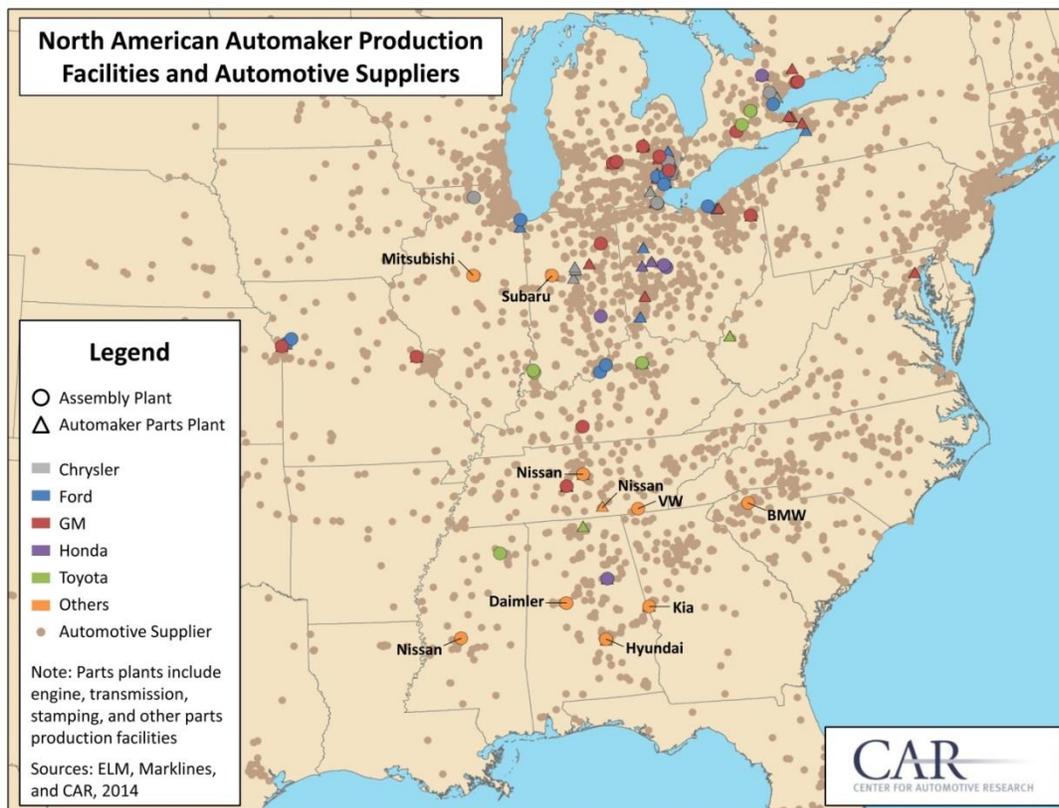
While this contingent of the workforce does not pose a significant challenge for employers, it is still a consideration with respect to site selection. Also, while training resources are not in short supply, those in industry do believe that auto companies could benefit from increased collaboration with and among institutions to help make programing more suitable to what an automotive employer demands.

Supply Chain Density

Geographic dispersion of existing automotive industry manufacturers can present challenges in soliciting continuing investment from foreign and domestic firms. Increased density in the SARA region auto industry offers benefits to prospective new companies in many ways. The interaction between density and workforce availability/training offers a particularly relevant example of the benefits that can be gained with increased density of the industry, particularly into cohesive clusters, as well as part of the rationale behind dispersion throughout the region. While increased density is a byproduct of the region's goal of a growing industry through continuous investment, it needs to be strategic in nature to fully benefit from the cluster strategy offering the most value to the region and investors.

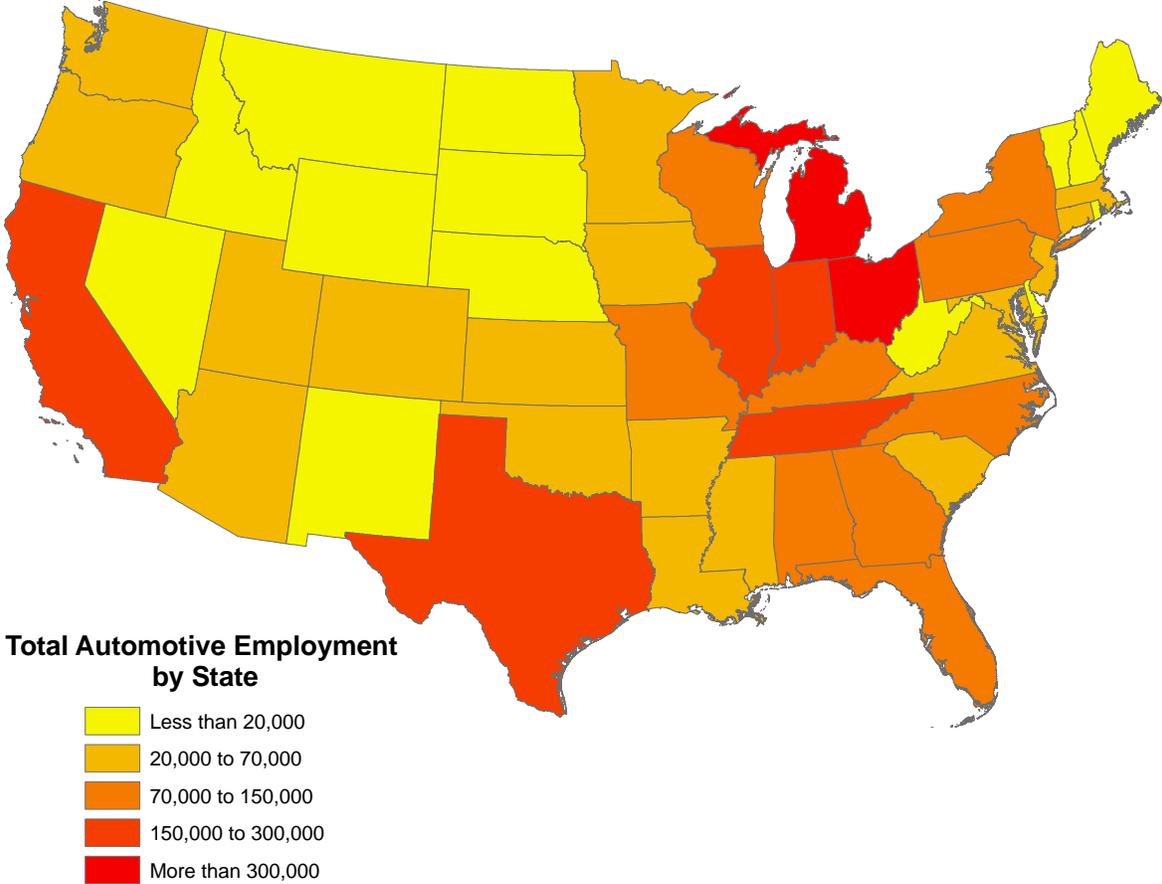
Chart 15 illustrates the difference between the density of OEM locations and the supplier network through Ontario and much of the United States. Facilities belonging to larger automakers are identified by color, while those of automakers with fewer facilities are identified directly on the map. The Midwest states traditionally considered to be automotive industry locations have a stronger supply chain than the southern region.

Chart 15: North American Automaker Production Facilities and Automotive Suppliers



The map in Chart 16 provides an illustration of automotive industry employment by automakers and suppliers in 2010. The map reveals a U.S. “automotive corridor” stretching from Michigan, through the SARA region, and culminating in Texas. Among the SARA states, Tennessee is the only state with automotive employment over 150,000. As a region, the SARA states exhibit a lower concentration of automotive activity than their northern counterparts. The causes for and implications of this lower density are discussed below.

Chart 16: Automotive Industry Total Employment by State



Source: CAR Research

CAR researchers found that often automotive manufacturers in the region reduce density by purposely not co-locating with other industry employers to gain a strategic position in the labor market. Given the importance of workforce availability to the automotive industry in this region, this is not surprising. CAR found that many businesses like to remain a minimum distance from other auto industry employers, and manufacturing employers in general, in order to attract the best candidates to work for their organizations. This is important for those on the lower tiers of the supply chain because they may offer lower wages than the large automotive OEMs or higher tier suppliers. While the rationale behind this practice makes sense to individual employers, in the aggregate, it creates disadvantages for the region.

While companies may have good reason to try to be the employer of choice in a given location, it also contributes to some of the problems that have been pointed out to CAR researchers. Motivation to distance one's organization from larger or competitive businesses can often lead to locating in more remote locales. While it is the case that production associates are accessible to companies without respect to location for the most part, skilled/maintenance associates and engineering/white collar employee availability may be affected by the companies' choice of location. Lack of industry density leads to the absence of the critical mass that supports local and regional educational resources that can create the type of skilled/maintenance workforce pipeline required for continuing industry development. It can be challenging for all but some of the largest automotive employers to create effective and convenient apprenticeship programs in isolation. Also, it can be challenging to attract engineers and white collar employees to rural areas, or areas without adequate cultural or educational institutions for their families. Industry representatives communicated the necessity of good primary and secondary school systems in the attraction of employees with high levels of education.

“For those companies that have a mother company in the North, I think they need more presence in their southern facilities. We have to step in and do more of running that business (undermanaged suppliers) than we would care to achieve that production.”

- Vice President, Administration, Automaker

There is value in dense clusters of industry activity. A cluster exists where economic activity in a set of related industries in a location reaches a critical mass and local linkages begin to have a meaningful impact on the performance of companies. It is at this point that opportunities for collaboration emerge and provide productivity benefits. According to the Harvard Cluster Mapping Project, clusters drive regional economic competitiveness by encouraging higher rates of job growth, wage growth, new business formation, and innovation. Clusters offer employers access to specialized regional suppliers, service providers, and institutions and allow them to benefit from pools of skilled employees and a dedicated infrastructure.⁷ Cluster strategy should be a consideration for the industry when evaluating alternative locales for potential investment, as well as for communities when attracting that potential investment. While the Southeast region viewed as a whole could be considered to be relatively less dense with respect to the automotive industry, lack of aggregate density in the region can be offset with few strategically located automotive supplier clusters.

⁷ “U.S. Cluster Mapping: Mapping a nation of regional clusters.” Harvard Business School and U.S. Economic Development Administration. Accessed Nov 17, 2014. <http://clustermapping.us/>

At a practical level, lack of supplier density is a growing issue due to automaker and supplier scrutiny of freight and logistics costs. The greater the distance components must travel, the higher the associated costs and the risk of supply disruptions due to traffic, construction, weather, and other delays. At the same time, automotive operations are running with lower levels of inventory, making proximity of suppliers and reliability of the associated supply chain increasingly more important. The problem is exacerbated by the elimination of excess capacity among automotive suppliers over the last few years. Supply problems at one supplier are less likely to be quickly remedied by sourcing from another firm. The companies interviewed for this study indicated that, in addition to problems related to production disruption as a result of missed deliveries from their suppliers, they are experiencing quality problems. These issues are an additional symptom of a supply base straining to satisfy demand.

On whether supplier density influences location decisions: “Yes, it does, because you’re dealing with your logistics cost, and you have to look at the impact of the logistics cost based on where you’re located.”

- Manager, External Affairs, Automaker

SARA Region Supplier Density Best Practice Example

One automaker interviewed for this study was currently in progress with a project to help combat supplier dispersion and take advantage of clustering near one of its facilities. In cooperation with both state and local governments, this manufacturer is facilitating the creation of a supplier park and logistics center in close proximity to its location. Recognizing the benefits of a cluster, and building on dissatisfaction from delays from their supply base (who deliberately located large distances from them, and each other), the automaker is working to change the paradigm that exists with their and other manufacturers’ suppliers, and gain from the benefits that a cluster will offer.

CAR consulted with one of the suppliers who had already located in the supplier park. The supplier used to keep several days of inventory at its previous facility and now only keeps hours of inventory. This supplier communicated that they used to ship multiple truckloads of assembled parts from out of state to the customer daily, and after creating a new location for final assembly in the park, its daily truckload shipments decreased by two-thirds. In addition, logistics costs have been reduced by half for the company and the manufacturer. The supplier has not had trouble attracting the necessary workforce – important because workforce scarcity is one of the reasons for the dispersed nature of the automotive industry in the SARA region. This means achieving density has proven successful in this instance and provides a best practice that could be emulated for other assembly plants in the region.

Examples of Inadequate Supplier Density

Areas where supply chain opportunities exist in the region are tooling and component fabrication. These sectors require sufficient economies of scale to justify a full range of capabilities. Companies in these sectors provide a broad range of services, often with highly cyclical customer demands. Therefore, it is challenging to sustain a business in one of these areas with only a sparse customer base.

Tool and die shops are a generic term for businesses that support the tooling needs of manufacturers. These businesses are essential to efficient production plant operations. The range of services that tool and die shops provide include:

- Program management of tooling-related services across a range of service providers
- Product and process engineering design for developing the tooling technology to fabricate parts from different materials
- Tools for fabrication, assembling, and checking (metrology) production parts
- Prototype services for new designs
- Low-volume production for new products or processes
- Tooling maintenance
- Production launch support

To be globally competitive, tool shops must have expertise and equipment to support one or more of these services. The capital investment can range from \$20 to \$30 million to launch a “full-service” shop that provides engineering, construction and tryout.

Another challenge in building a tooling supply base is that tooling relationships with customers tend to be long-term with high barriers to entry. Domestic facilities (owned by foreign firms) that need new tools tend to rely on their traditional tool suppliers – which are often located in their home countries. This limits the profitable portion of services that a shop can provide, resulting in a mostly specialized shop for tool maintenance that still must carry significant overhead in tool and die expertise and capital equipment. Due to the region’s low density of tool and die facilities, many of the automakers and suppliers in the region have smaller in-house tooling facilities to complete work that would normally be done by a tool and die supplier.

The second area where supply chain opportunities exist is in process fabrication. Fabricator technology is continually evolving as new processes develop from new materials. Several examples of material trends that call for suppliers of advanced materials and processes include:

- High strength steel (cold stamping)
- Ultra high strength steel (hot forming)
- Aluminum forming (stamping and/or warm forming)
- Thin wall die casting (aluminum and/or magnesium)
- Laser weld blank welding (steel and/or aluminum)
- Composite forming (RTM, etc.)

Components and parts fabrication companies must be at the cutting edge of new material and process development. Sustaining consistent work while the technology evolves is a challenge.

Research and Development Density in the SARA Region

The Research and Development (R&D) field provides the SARA region with a key opportunity to attract more investment that brings with it high-paying jobs that call for and help further generate a highly skilled workforce. Research activities are typically long-term and result in the creation of new processes or products as opposed to preparing for production. Development is applied, typically short-term, and often associated with launching new products.

While research activity has traditionally been more likely to be performed at a company's headquarters, development work is much more distributed among the firm's facilities and therefore presents a greater opportunity for the SARA region. Likewise, testing of new components and technologies presents the region with another key opportunity not tied to basic research.

On the research side, the region boasts world-class universities and several government laboratories that can be an asset to automakers and suppliers struggling to meet upcoming fuel economy and safety regulations, as well as consumer demand for increasingly sophisticated vehicles and components. Given that automotive firms are increasingly open to accepting new technologies from non-traditional sources, these needs present an opportunity for the SARA region to benefit from additional research activity.

The companies interviewed for this study indicate that their corporate parents, whether in North America or especially overseas, are increasingly running low on R&D capacity in their operations. As a result, they are more dependent on the facilities in the SARA region taking on additional development responsibility. This dynamic provides the SARA region states with an opportunity to attract additional development jobs to the region, which would provide high-paying jobs while enhancing the region's overall automotive density.

Table 1 provides a breakout of company R&D spending for the region, as well as several northern states for comparison. The Southeast region states accounted for just over one percent of national automotive R&D spending by automakers and suppliers. Over 80% of the R&D done by automakers and suppliers in the U.S. takes place in the northern states. The main factor in the dominant position of the northern states is the degree of basic research conducted in the region. Development is more geographically dispersed. The SARA region boasts a variety of universities, U.S. national labs, and other institutions that perform automotive research. The main areas of opportunity for the SARA region therefore lie in attracting additional development work from automakers and suppliers, while continuing to expand the research done by the region's universities and laboratories.

Table 1: Domestic Automotive and Transportation R&D Company Spending by State, 2011

Location		Automotive	
State	Region	Amount (millions)	Percentage of US
AL	SARA Region States	\$31	0.26%
GA		Not Disclosed	Not Disclosed
KY		Not Disclosed	Not Disclosed
LA		\$2	0.02%
MS		\$4	0.03%
SC		\$26	0.22%
TN		\$88	0.75%
CA	Other U.S. States	\$397	3.38%
IN		\$368	3.14%
MI		\$8,869	75.56%
OH		\$198	1.69%
SARA Region Total		\$151	1.29%
United States Total		\$11,737	100.00%

Source: NSF. (2014). "TABLE 15. Domestic R&D paid for and performed by the company, by industry and company size, by state: 2011." National Science Foundation.

The R&D field, together with the education initiatives discussed in the workforce section of this report, presents SARA region educational institutions with prime opportunities for collaborative efforts. An excellent example is the Industry/University Cooperative Research Center (I/UCRC) recently proposed by a consortium consisting of Auburn University, the University of Alabama at Huntsville, and Tennessee Tech university. In addition to being a collaborative effort between education institutions in the states of the SARA region, the center would work closely with the automakers and suppliers in the SARA states.

Conclusion

The automotive industry in the SARA region is growing. Vehicle production has returned to pre-recession levels, and automotive employment is forecast to equal previous highs by the end of 2014. Both vehicle production and employment, however, are forecast to level off in the next few years.

In order to avoid stagnation and continue its history of growth and prosperity, the region needs to attract additional automotive investment, while retaining and reinvesting in its current automotive endowment. Along with broad global competition, the chief obstacle to these goals is a surging Mexico, which has attracted all of North America's assembly plants for the last five years and has likewise significantly grown its automotive supplier endowment and R&D capability.

In the automotive South, the expansion of the industry is often impeded by barriers common throughout the region, indicating a need to identify synergistic opportunities for the region. CAR has focused on providing to the region's stakeholders recommendations for regional collaboration and programs that can address these regional obstacles.

Prior to embarking on the individual recommendations, it is necessary that the region form a framework to coordinate the implementation of these strategies, as well as other initiatives. CAR believes it imperative to the region's success and growth going forward to coalesce around a regional strategy to undertake initiatives to strengthen the region and enhance its ability to retain and attract automotive employment.

Appendix 1: Automotive Investment Factor Questionnaire

The Center for Automotive Research (CAR) is conducting a new study that will concentrate on factors affecting investment in new and existing automaker and automotive supplier facilities. CAR researchers seek to better understand the factors that companies care about and how these factors affect site selection and investment decisions.

With input from economic developers in automotive communities, CAR researchers have developed a questionnaire that will be used to guide meetings with automotive companies. This questionnaire contains questions related to how officials at the state and local level can better serve and partner with firms looking to open a new facility or expand an existing facility in the community.

Expansion/Location Process Decisions

1. Site Selection
 - a. How important are the following factors to your site selection and investment renewal decisions?
 - i. Flexible, personalized incentive packages
 - ii. Local tax rates
 - iii. Regulatory environment (e.g. permits)
 - iv. Political climate
 - v. A local skilled workforce
 - vi. Shovel-ready or pre-verified sites
 - vii. A “one-stop-shop” for permits, economic development, regulatory compliance
 - viii. Universities and community colleges interested in partnering with nearby businesses to meet workforce and research needs
 - b. Please describe characteristics of a community in which your company would like to make a new investment.
 - c. What about brownfield redevelopment versus green-field development? Is one type preferred?
 - d. What have your experiences been like when working with utilities in the past? Have they been helpful and cooperative partners, or have your relationships been challenging?
 - e. Do you use site selection consultants, brokers, tax incentive consultants, etc.? Why or why not?
2. Incentive Packages
 - a. Does your company have an operating cost calculating tool that can be used to compare the costs of running a plant in various communities? If not, do you compare these costs between communities, and how?
 - b. Are there distinct regional differences in sites and incentive packages that communities offer? (e.g., Midwest states compared to Southern sites)
3. Supply Chain and Research and Development Support
 - a. Do you have constraints in your current supply chain – either performance or capacity constraints? What are the causes?

- b. Do you have constraints in your access to adequate research and development support?
4. Work Skills & Training
- a. Is your company adding, cutting, or maintaining overall U.S. employment levels?
 - b. In the next 12 months, does your company plan to add, cut, or maintain U.S. employment levels for:
 - i. Engineers and Technicians
 - ii. Management
 - iii. Supervisors
 - iv. Salaried, Other
 - v. Hourly Production
 - vi. Hourly Multi-Skilled Maintenance
 - c. What are the five most difficult positions to fill in your company's U.S. locations?
 - i. What level of experience are you looking for in candidates for these five positions?
 - ii. What is it about these positions that make them difficult to fill?
 - d. What are your main sources of candidates for open positions?
 - i. Job postings
 - ii. Referral
 - iii. Educational programs
 - iv. H1B/foreign workers
 - v. Co-op/internship
 - vi. Internal pools
 - vii. Hiring agencies
 - e. What types of programs or partnerships does your company have with educational institutions?
 - i. Colleges/universities
 - ii. Community colleges/technical schools
 - iii. High schools
 - iv. Elementary/Junior high schools
 - f. What one thing can educational institutions do to better meet the current (and future) employment needs of your company?
 - i. Colleges/universities
 - ii. Community colleges/technical schools
 - iii. High schools
 - iv. Elementary/Junior high schools
 - g. Does the presence of organized labor influence your site preferences?
5. Final Thoughts
- a. Is there anything else we haven't asked, but we should know, about the site selection process?

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