

Impact of the Southeastern Automotive Supply Chain Network

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Abstract

Over the last three decades a number of automotive assembly plants have located in the southeastern states in the U.S. These location decisions are described along with the related location decisions by suppliers. In addition, infrastructure improvements have been completed and spillover effects have provided additional benefits to the region.

Keywords: supply chain network, automotive suppliers, automotive assembly plants

Introduction

Facility location is an important strategic decision in supply network design (Chopra and Meindl, 2013). The locations chosen for major manufacturing and distribution facilities will have long term effects on the company's supply chain performance and financial performance.

A long list of factors to be considered during location analysis is typically presented in the literature and textbooks. Macroeconomic factors that tend to receive the most attention include: "quality of workers, cost of workers, cost of facility, availability of infrastructure, proximity to customers, the location of that firm's other facilities, tax effects, and other strategic factors" (Chopra and Meindl, 2013).

The analysis typically includes a subset of the listed factors ranging from five to ten desirable location characteristics. While the factors are deemed important in the upfront evaluation, the actual results do not receive a great deal of attention after the facility is built. Actual results may also reveal any differences between primary and secondary factors or the potential for secondary factors replacing primary factors in importance.

It is also revealing to compare the theoretical with the practical by looking at a list of factors based on information gathered from industrial location practitioners. "Manufacturing and distribution companies tend to locate in close proximity to highway interchanges or rail systems.

And with heavy trucks costing about US\$1 per minute to operate, the distance from the highway interchange — or the level of congestion along the road — does impact a firm's bottom line” (Kalinski, et al., 2010). Most manufacturers do look for easy access to major highway systems and this becomes paramount when assembling automobiles because trucking is used for the vast majority of product movement leaving the assembly plants.

From the same publication, the top ten factors identified by corporate real estate executives are:

1. Transportation infrastructure
2. Existing work force skills
3. State and local tax scheme
4. Utility infrastructure
5. Land/building prices and supply
6. Ease of permitting and regulatory procedures
7. Flexibility of incentives programs
8. Access to higher education resources
9. Availability of incentives
10. State economic development strategy (*Site Selection*, October 2009).

International Automakers

A number of international automakers have located assembly facilities in the southeastern U.S. over the last three decades. Many of the location decisions have occurred in the most recent ten to fifteen years. The companies in question are German, Japanese and South Korean firms looking to establish assembly plants in the U.S. to exploit a variety of factors in the North American market. Along with the decisions by the major foreign auto assembly companies, a substantial supplier base has developed in the immediate area as well. As of 2005, the proportion of foreign-owned suppliers in the southern states was more than double that of domestic automotive suppliers (Klier, 2005a). The number of foreign-owned suppliers in the south has increased further with the recent assembly plant additions by Nissan, Hyundai and Kia in Mississippi, Alabama and Georgia respectively.

As one example of the magnitude of the impact of the international automakers, the number of vehicles assembled in Alabama in 2014 reached a record number of 997,270 when combining the production of Mercedes-Benz, Honda and Hyundai according to the Associated Press (AP, 2014). The following table (Figure 1) lists the major auto assembly plants in the south with all but one located in the southeast:

State	City (or Town)	Company	Started Production
Alabama	Vance	Mercedes-Benz	1995
Alabama	Lincoln	Honda	2001
Alabama	Montgomery	Hyundai	2005
Georgia	West Point	Kia	2010
Kentucky	Georgetown	Toyota	1988
Mississippi	Canton	Nissan	2003
Mississippi	Blue Springs	Toyota	2011
South Carolina	Greer (Spartanburg)	BMW	1994
Tennessee	Smyrna	Nissan	1983
Tennessee	Chattanooga	Volkswagen	2011
Texas	San Antonio	Toyota	2006

Figure 1 Southern Auto Assembly Plants for International Automakers

The development of new automotive assembly plants contributes to the region's economy in many different ways. Building the facility creates jobs in construction and related industries. Other infrastructure may be required such as new access roadways. New utilities distribution and connections must be installed. Other support functions are needed and even new hospitality businesses such as hotels and restaurants are added. Ultimately, when completed, the assembly plant becomes a major employer in the area with typically 1,000 or more employees.

In addition to the main assembly plant, numerous suppliers choose nearby locations leading to multiple facility construction projects. This naturally repeats all of the related activities as mentioned for the assembly plant but on a somewhat smaller scale in most cases.

In the remainder of this paper we will look at the main factors that influence the location decisions and then also look at some of the impact factors associated with a sample from the assembly plants listed above.

Decision Factors

Choosing a location near good transportation infrastructure is among the top factors as practitioners have indicated (Site Selection, 2009). The old automotive assembly and automotive supplier locations developed primarily in the Midwest and in relatively close proximity to the interstate highway, I-75, which runs from Detroit to Atlanta (Klier, 2005b). The majority of those locations are associated with the Big Three U.S. automakers and are heavily concentrated at the northern end of I-75 near Detroit and surrounding areas.

The new developing automotive corridor has moved slightly to the west with many locations chosen that are within 100 miles of I-65 which traverses the states of Indiana, Kentucky, Tennessee and Alabama (Klier, 2005b). Toyota in Indiana and Kentucky, Nissan in Tennessee, and three different companies in Alabama fit this geographic pattern very closely. There are a few exceptions such as BMW in South Carolina and the new Toyota facility in San Antonio, Texas. But the location of Kia in West Point, Georgia for example might be seen as an attraction towards I-65 since the location has good access to I-85 which does connect to I-65 in Alabama.

The southern states also have the advantage of being “right-to-work” states. “Right-to-work” means that there is “[a] state law or constitutional provision that prohibits the use of labor union membership as a criterion for hiring or continued employment” (Right-to-work state, 2011).

Of the “right-to-work” states, six states have landed the majority of the foreign auto assembly plants. Alabama, Georgia, Mississippi, South Carolina, Tennessee and Texas are the southern states in question with only Texas being outside what is considered to be the southeastern state grouping. Indiana and Kentucky are not “right-to-work” and the facilities located there pre-date the trend to locate further to the south.

Virginia and North Carolina are also “right-to-work” states but have not secured a major auto assembly facility. But a number of auto supplier facilities have chosen to locate in both of those states. Other “right-to-work” states include Arkansas, Florida, and Louisiana and those states are not analyzed in more detail for this paper since they do not host a major assembly plant. The following map shows the “right-to-work” states in the U.S.

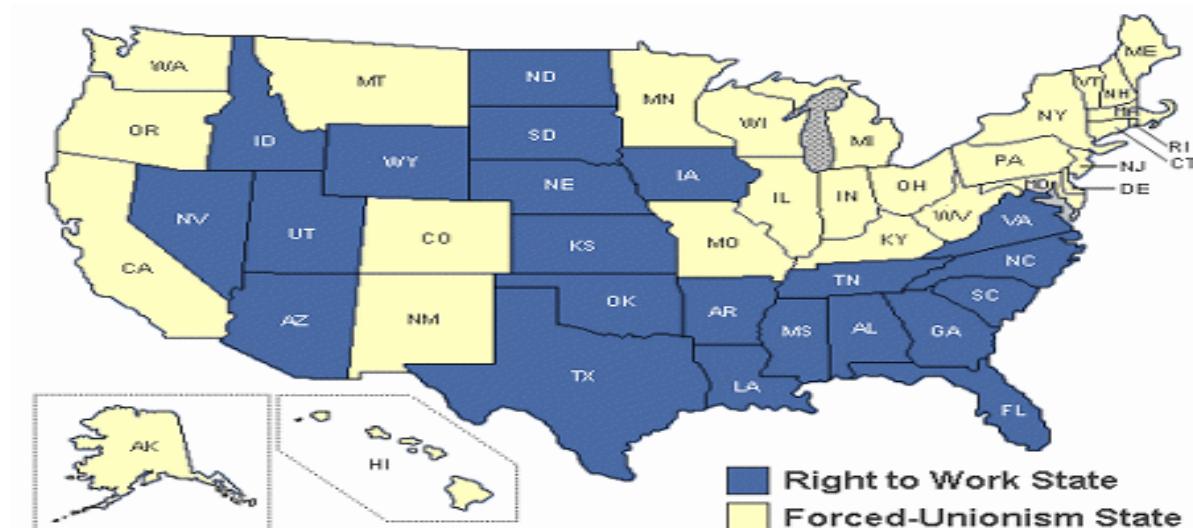


Figure 2 Map of Right-to-Work States

SOURCE: <https://search.yahoo.com/search?fr=mcafee&type=B111US105D20130613&p=right+to+work+states+map>

State Incentive packages are a major factor for companies deciding to locate auto assembly plants. Each company typically receives well-crafted proposals from four or five different states competing for the new facility. Tax incentives, zero interest or very low interest financing arrangements, reduced state fees and a variety of other financial inducements are usually included in the incentive packages offered by the states. Counties and cities may bundle together other incentives in an attempt to make the state and local combination even more attractive compared to the next competitor.

Quality of the workforce, access to reliable utilities, cost of land, and cost of construction would round out the list of factors for making the decision for the assembly plant. Every southern state offers workforce training programs with customized training for the individual company in most instances. The other factors do not have a great degree of variability but in some situations may need improvement for a location under consideration. Overall, the items listed here may be viewed as secondary factors while the previous three – transportation, right-to-work, and state incentives – are viewed as primary factors for the decision.

Subsequently, for the automotive supplier, the number one primary factor is proximity to the assembly plant that they intend to supply. Once the auto assembly company makes their decision then the supplier begins the process to find a suitable location nearby. Ultimately, the supplier reaps many of the same benefits as the auto assembler.

Another dynamic at work is the requirement by the assembly plant that a supplier must build a supply facility nearby to their chosen location. Typically this is based on long term relationships that carry over from the existing buyer-supplier relationships in the home country. But even some domestic automotive suppliers are asked to locate nearby to provide their items on a just-in-time basis. The short distance between facilities is consistent with the lean requirement to eliminate waste in all aspects.

Impact Factors

States and localities actively pursue the auto assembly plants and offer the incentive packages because there are many economic benefits to be gained. Looking at a few examples at the state level, Kentucky has the Toyota assembly plant in Georgetown which began production in 1988. Kentucky also has more than 50 major employers in “The South’s Top 100 Auto Suppliers by Employment” (Southern Auto Corridor, 2007). BMW began production in South Carolina in 1994 and South Carolina has around 30 major employers on that Top 100 list (Southern Auto Corridor, 2007). Those two states have the benefit from roughly a 20 to 25 year history with the major assembly plant located there. Kentucky also benefits from the Big Three facilities located in the commonwealth with GM located in Bowling Green and Ford located in Louisville.

It is also interesting to note that while North Carolina has not landed a new major auto assembly plant, the state still boasts auto supplier employment that surpasses 22,000 in total at sixteen different locations among the Top 100 list (Southern Auto Corridor, 2007). This is largely attributable to the North Carolina locations selected by several major tire manufacturers including Kelly-Springfield, Uniroyal/Goodrich, Bridgestone/Firestone, and Continental Tire. Employment in those North Carolina facilities places each of them among the Top 20 auto supplier employers in the south (Southern Auto Corridor, 2007). North Carolina also has facilities that were previously Freightliner truck assembly locations which became part of the Daimler Chrysler franchise and now continue under the Daimler flagship.

Virginia is similar to North Carolina in the fact that the commonwealth has not successfully landed one of the newer auto assembly facilities. On the negative side, a Ford truck assembly plant in Norfolk which opened in 1925 was closed in 2007 (N.Y. Times, 2008). The only notable assembly operation is the Volvo Truck facility in Dublin, Virginia. But even without a major assembly plant, Virginia does have a number of auto supplier facilities. Ten different supplier facilities rank in the Top 100 and account for more than 8,000 employees (Southern Auto Corridor, 2007). Two major tire plants and four different locations for Lear Corp. facilities are included in the major auto suppliers operating in Virginia (Southern Auto Corridor, 2007).

Assembly Plant Impact

The more recent assembly plants have not been widely publicized. The available information tends to reside on the company's own website or within promotional materials from the local or state economic development agency. The newest facilities include Kia in West Point, Georgia with start-up in 2010, Toyota in Blue Springs, Mississippi with production starting in 2011 and Volkswagen (VW) in Chattanooga, Tennessee which also opened in 2011. To view some of the impacts for the new assembly plants, a summary is provided and data are also summarized for two of the more established facilities for comparison. The following Table (Figure 3) summarizes some of the primary facts about the assembly plants selected.

Start Date	Company	Investment	Size (Sq.Ft.)	# of Employees	# of Supplier EEs	Annual Prod. Vol.
2010	Kia	\$1.6 B	n/a	3,000	11,000	360,000
2011	Toyota	\$800 M	n/a	2,000	n/a	150,000
2011	VW	\$1 B	1.9 M	3,200	9,500	150,000
1994	BMW	\$6 B overall	5+ M	8,000	30,000*	300,000
1995	Mercedes	\$4.4 B overall	3.2 M	3,200	n/a	174,000

Figure 3 Fact Sheet for Selected Assembly Plants (multiple sources)

From Figure 3 we can see that the five assembly plants highlighted here have a combined annual production capacity of more than 1.1 million vehicles. Total employment for the five assembly plants amounts to 19,400 jobs and even with missing data we can state that the number of jobs created by automotive suppliers is more than 50,000. The asterisk (*) for the 30,000 reported for suppliers associated with BMW denotes that a study conducted by the University of South Carolina is the source for that number (Collins, AP, 2014). The following bullet points also provide additional descriptions for some of the assembly plant achievements and impacts:

- Toyota had 41,000 applicants from every county in Mississippi and from several other states prior to the plant opening in Blue Springs, MS in 2011.
- Kia built “one million vehicles in less than four years” (www.kmmgusa.com).
- VW is the only LEED Platinum certified auto assembly plant in the world. The plant utilizes energy from 33,000 solar panels installed on 66 acres. The plant also reuses rainwater for cooling and for restrooms saving up to 350,000 gallons of water per month (<http://www.volkswagengroupamerica.com/facts.html>).
- VW has 400 robots in a fully automated body shop performing all welding jobs.
- VW announced in 2014 that a new midsize SUV would be built in Chattanooga with an additional investment of \$900 million and the creation of another 2,000 jobs (VW Press Release, July 14, 2014).
- BMW achieved the fastest start up for any auto assembly plant in the world – only 23 months from start to finish (1992 to 1994).
- BMW has produced more than 2.9 million vehicles in SC over 20 years through December, 2014.
- BMW has increased production by 9X compared to the original plan developed in 1992.
- BMW announced in 2014 a \$1 Billion expansion which will increase annual production capacity to 450,000 vehicles.
- Greer, South Carolina is now the location for a new Inland Port with rail service directly to the Port of Charleston, SC. The Inland Port is located adjacent to the BMW campus and provides convenient import and export services by rail for BMW (South Carolina Ports).

Summary

From the examples provided, it is reasonable to suggest that “transportation infrastructure”, “Right-to-work” laws, and “state incentives” have played significant roles in the decisions made by international automakers when selecting auto assembly plant locations. The growing presence of the international automakers in the U.S. as manufacturers has also led to significant economic impacts across a very specific region in the southeastern U.S.

From the data and descriptions presented here we can begin to see the substantial impact that the international auto assembly supply network has provided across several southeastern states. That

impact is not limited to just the assembly plants. Once the assembly plant location is selected a much broader network of suppliers and related organizations also begins to develop. In that regard, the international assembly plants serve as a powerful attracting force that draws the other organizations to the area. In some instances the assembly firm may even demand that another organization establish a supply facility nearby.

Limitations and Future Research

The main limitation is the lack of recent data for some of the assembly plants and for some of the automotive supplier data. Secondary data has been used extensively. The accuracy of that data has been confirmed where possible but in some instances a confirming source was not found. This paper has also focused only on relatively new international automotive assembly plants in the U.S. Expanding the discussion to North America would bring a number of other facilities into the discussion.

Future research will focus on obtaining data directly from the manufacturing companies and economic development officials who have knowledge about the decision making process for locations within the southeastern automotive network. Company data and industry statistics will be sought to develop a more complete discussion about the factors affecting location decisions. More thorough information about the resulting impact will also be a focus for the follow-up research. The anticipated results should be a massive set of evidence showing the very substantial impacts which have been realized from the development of the southeastern automotive supply network.

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