

# SUPPLY CHAINS: THE ODYSSEY OF A HONDA

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**T**he Honda Odyssey is made in Lincoln, Alabama. Or maybe it would be more accurate to say that in Lincoln, Alabama, parts and components from all over the world meet to become a Honda Odyssey.

The same is true in Georgetown, Kentucky, where the Toyota Camry is built; West Point, Georgia, where they build the Kia Telluride; Chattanooga, Tennessee, and Tuscaloosa, Alabama, where Volkswagens and Mercedes-Benz products, respectively, roll off the lines, as well as Warren, Michigan (Ram trucks); Wayne, Michigan (Ford trucks); and Arlington, Texas (Cadillac Escalades and Chevy Tahoes, among other products).

The story of every modern motor vehicle the world over—and a great many manufactured goods more generally—is the story of complex manufacturing and sales processes that can be as circuitous and often unexpected as the tale laid out in the Honda minivan’s namesake. The Odyssey ventures into multiple countries and involves numerous actors. Technology, trade rules, and competitive pressures have combined to enable the creation of a web of supply chains that have bound the global economy together and resulted in higher-quality, more innovative products that give consumers greater choice at lower costs. Not coincidentally, those global supply chains have kept the North American auto industry and North American auto production global-ly competitive.

## WHAT ARE SUPPLY CHAINS?

With globalization blamed for many of the ills of the modern era, it is worth recounting what supply chains are, how they operate, and the benefits of the complex supply chains companies now employ. In short, supply chains are the steps required to get a product to the customer, including developing a product, producing it, transporting it, and selling it.

At points in the past, these functions were performed in one country—even in one location. The most famous example is the River Rouge plant in Michigan that Henry Ford built, where sand and iron ore were poured in at one end and a car popped out at the other end. Today, the mass production system model for which Henry Ford is rightly famous has been both retained and refined: Production functions that once were centralized have been spread out with a view to ensuring that a finished car or truck is cost-competitive, quality-competitive, and delivered to the customer on a timely basis.

Today, the global supply chain is not just about manufacturing. Major automakers whose headquarters may be in Europe or Asia have design and styling, research and development (R&D), and testing facilities across the United States. All of this is part of the effort to satisfy the world’s most discerning customers in the world’s most open and competitive auto market.

In the automotive sector, product design and development may occur in an automaker’s dedicated facility. Parts production takes place at both in-house and outside supplier locations,

with final assembly of the finished vehicle conducted at yet another of the automaker's plants. In setting up supply chains, automakers identify their own core and non-core competencies and establish relationships with outside suppliers with expertise in non-core areas.

## **TECHNOLOGICAL DEVELOPMENTS AND TRADE AGREEMENTS**

Complex supply chains have been facilitated by a series of technological, regulatory, and business developments over the past several decades.

For example, advances in information and communications (ICT) technology have provided critical tools necessary for effective supply chain management. Information management software, ever more powerful computers, and communications technologies such as broadband service and smartphones have made it possible to coordinate the process of ordering and delivering the many thousands of parts required to manufacture a car. GPS and radio-frequency identification (RFID) technologies likewise have made it possible to track the movement of supplies to ensure timely deliveries. Specialized businesses have carved out a niche deploying these technologies in the areas of logistics, communication, and business services to partner with multiple companies and industries so that they can further increase the effectiveness of supply chains and reduce their cost.

Another breakthrough technology that facilitated complex supply chains and international trade more generally was the development of standardized shipping containers and intermodal transport systems for those containers. This greatly reduced the cost of shipping goods both domestically and internationally, opening up new doors for drawing on supply sources remote from the final assembly facility, including internationally. At the same time, emerging markets overseas improved their transportation and other infrastructure that enabled them to link into global supply chains.

Along with these technological developments, trade agreements have reduced tariff and nontariff barriers to moving goods across borders and have contributed to greater certainty and stability in the international business environment. This too has opened the door to broadening supply sources and moving inputs and finished goods internationally at lower cost. In the automotive sector, for example, the North American Free Trade Agreement (NAFTA) facilitated fully integrated North American supply chains in which parts for any given vehicle are typically sourced from all three NAFTA countries. In many cases, the production process for a finished part is itself broken up into multiple locations, with the part traveling across borders several times before completion.

## **A TYPICAL PRODUCTION PROCESS: TRAVELING ACROSS BORDERS**

Two years ago, Bloomberg took a fascinating look at the journey of some parts going into modern vehicles:<sup>1</sup>

- A Grand Rapids, Michigan, company buys capacitors from a company in Colorado, which gets them from a number of suppliers in Asia.
- Those capacitors are shipped to Mexico, where they are integrated into a circuit board.
- The boards are stored in El Paso before being shipped to another plant in Mexico, owned by a Norwegian company, that puts the circuit boards into a seat actuator—basically, the mechanism that allows you to fold the seats in a minivan or an SUV with the simple touch of a button.
- The actuators are then shipped to plants in Texas and in Ontario, Canada, where an American company makes finished seats.

- Once finished, those seats are installed in vehicles built a short distance away.

All told, the parts may cross international borders five or six times before going to the final assembly facilities in the U.S. You could deconstruct (literally) just about any vehicle and find hundreds of similar examples.

Producers look for the greatest freedom in sourcing lower-cost, commodity-type parts, but while cost is one factor in developing a supply chain, it is not the only consideration. “Just-in-time” manufacturing processes like those in the auto sector require that key parts be sourced from locations and suppliers that present a low risk of supply disruption. In addition, quality and safety requirements also frequently lead to sourcing from locations relatively close to a final assembly facility, both to ensure proper oversight of the supplier’s operations and to ensure that problems can be corrected promptly. Parts specific to a vehicle under development may likewise be sourced more locally in order to allow better coordination with design or engineering teams.

Thus, considerations of cost, reliability, and quality all play a part in developing supply chains. The most apparent results for consumers are lower prices for automobiles, but the cost savings that complex supply chains generate also allow automakers to invest more in developing innovative features and to offer these features in vehicles at reasonable prices. All of this boosts vehicle demand to the benefit of both companies and their employees.

The competitive advantages of complex supply chains are such that access to them is a central consideration in company decisions about where to invest and produce. Technology, infrastructure, and the integrated North American market created by NAFTA have made the United States a highly effective supply chain hub and, thus, a very competitive manufacturing platform. As a result, the United States has attracted billions of dollars of investment in manufacturing, design, and R&D facilities.

International automakers alone have invested nearly \$82 billion in the United States,

directly employing 133,000 Americans at nearly 500 facilities. Together, these companies create jobs for 1.29 million Americans in design, R&D, manufacturing, sales, finance, and dealership operations as well as other businesses. They produced nearly half of all cars, SUVs, vans, and light trucks made in America last year and accounted for nearly half of vehicle exports in 2016, exporting 17 percent of their production to 140 countries and territories.

## **LOOKING TO THE FUTURE: ELECTRIFIED AND AUTONOMOUS TRANSPORTATION**

As the auto industry looks to the future, the role and importance of global production chains are only going to increase, for several reasons. Foremost among these reasons is the major transformation to electrified and autonomous transportation that the worldwide auto industry is currently undergoing. Automakers have made enormous investments and commitments to bring electrified vehicles to market over the next five years. One can properly debate the best policies for achieving the goals of zero-emission or carbon-neutral transportation—sustainable market incentives will be more successful and enduring than government mandates—but the direction is clear.

The enormous capital investments required to transform the fleet increase the competitive pressures on companies to find the best and lowest-cost components to bring about the transformation. Electrified vehicles have narrowed the cost gap with internal combustion vehicles in recent years, and there is still a distance to go. But if the public policy goal is to reduce emissions from motor vehicles through electrification, it makes no sense to limit the ability of manufacturers to obtain the best low-cost electric motors, batteries, and raw materials that will make a zero-emission future possible.

The same is true for autonomous vehicles. Whether we get to a driverless future or not, many of the technologies that could make

autonomous vehicles possible will provide tangible safety and other benefits to the public today. For example, emergency braking systems are already at work to reduce collisions. The sensors that warn you of an impending crash are constantly being refined and improved for future uses. Artificial intelligence capabilities are expanding rapidly. The ability of cars to talk to each other (vehicle connectivity) will provide another layer of protection from crashes.

Automated and connected vehicles will save us time, lives, and money. As with electrified vehicles, however, if the benefits of automated and connected vehicles are to be fully realized, manufacturers must be able to use the best technologies available at the lowest cost possible.

It should also be noted that many of the new entrants into the auto industry—companies looking to build electrified and automated transportation—have established U.S. offices *in advance* of beginning full-scale production. Some of them even describe themselves as “virtual auto companies,” knitting together worldwide operations in a manner and scale far different from what we have known.

Critics of global supply chains often overlook the fact that the jobs that add the highest value to a product often stay in locations closest to the customers (in this case, in the United States). For example, the high-value-added design and intellectual property of an iPhone remains in Cupertino, California, even though Foxconn might manufacture the actual phone in Asia. Similarly, some of the most legendary auto products were designed by teams working in California for U.S. and globally based companies. All told, 12 international automakers operate 36 automotive design and R&D operations in California, taking advantage of the state’s reputation as a center of fashion and design.

## CONCLUSION

The basic question is: If not for global supply chains, would auto production in the U.S. be as strong, innovative, and competitive as it is today, particularly in the face of increasing competition from both old and new business ventures? The answers are revealed by the facts: The U.S. auto industry is not just viable. It continues to stand at the leading edge of innovation and competitiveness worldwide.

## ENDNOTE

1. Thomas Black, Jeremy Scott Diamond, and Dave Merrill, “One Tiny Widget’s Dizzying Journey Through the U.S., Mexico and Canada,” Bloomberg, February 2, 2017, <https://www.bloomberg.com/graphics/2017-trump-protectionism-alters-supply-chain/> (accessed September 7, 2019).