

In the world of trade, the company with the ability to transport freight in the most cost and time efficient manner reigns supreme in their industry. Therefore; an essential part of transportation management lies in building an efficient supply chain from the six main modes of transportation: road, maritime, air, rail, intermodal, and pipeline. Understanding the strengths and weaknesses of each mode is paramount to building an effective supply chain.

Logistics managers hire the carrier who fits four traits – whoever can move the greatest volume of product with the greatest speed over the greatest distance at the lowest cost. All companies hold these four traits to different levels of importance but overall this principle remains true across the board.

The modes by which companies approach these four aspects of shipping has changed over time and is still changing to this day. Each of the six main modes of transportation has its own advantages and disadvantages for shippers to take into consideration. The first step toward choosing the right mode is understanding the aspects that make each mode unique from the others.

Road Transportation

The first, and most common mode of transportation in logistics, is road. From walking to horses to wagons to bikes to cars to trucks, road transportation has been around longer than mode and is utilized the most of any mode in logistics.

With the continued improvement of vehicles and road infrastructure, transportation by road is the most versatile of the four main modes with the least geographical constraints. This attribute of road transport makes it the preferred mode for smaller loads over a shorter distances and as such, road is the only mode that performs door-to-door deliveries. Consequently, most shipments that initially were carried by another mode of transportation are completed by road transportation.

Anything that can be shipped in small-to-medium quantities can be shipped by road. Small packages (or Parcel) can be transported in a vehicle no larger than personal car. Companies specializing in ecommerce ship parcel when there are hundreds, if not thousands, of small packages being shipped to different locations (Parcel is often made up of different modes of transportation, but always picked up and delivered by truck).. On the flipside, shipments larger than 150lbs. are considered freight and require a truck. The two main forms of road transport are Less-than-Truck-load (LTL) and Truck Load (TL).

LTL transports smaller shipments (primarily palletized shipments) to their respective locations along a specified route. The route begins and ends at a specified hub of origin and makes various stops according to the number of different shipments it is carrying. This system of transportation is known as the Hub and Spoke model. The advantage of LTL is that the shipper only pays for the portion of the truck occupied by their freight while the rest is payed for by the shippers using the rest of the truck. The disadvantage of LTL is the multiple stops and transfers that the shipment undergoes en route to its destination. A shipment will be transferred multiple times to different trucks along the route much like a passenger on a plane will be transferred to different planes en route to their destination. This results in a longer shipping time and the possibility of the shipment being damaged.

TL is much faster than LTL because it does not operate on a hub and spoke model. As such, the truck will go from origin to destination with no additional stops or transfers along the way. The drawback to TL is that a shipper must ship a lot of freight in order to make the shipment economical. Generally, if a shipment is longer than 16 linear feet or 20,000lbs or greater, it is cheaper to ship TL. In other cases, a shipper needs a shipment moved much faster than LTL and cannot ship by air due to cost or size regulations.

The main downside to road transport is the external influences that play into its effectiveness, primarily weather, traffic, and road regulations, three things that mostly don't influence other modes. In addition to these drawbacks, in the current shipping environment it has become increasingly difficult to find truck drivers. This capacity shortage has led to an increase in intermodal transportation.

Maritime Transportation

Shipping by water has been practiced for thousands of years and remains pivotal to today's global trade. 90% of all international trade is accomplished through maritime transportation. Cargo ships travel on almost every major body of water and have capacity to transport the highest volume of freight of any mode of transportation at the lowest cost.

The routes available to container ships are calculated and strictly followed. Many routes used today have been used for centuries. However, new routes are still being sought out and tested for optimal supply chain efficiency. In the past few months, Maersk sent a cargo ship over the Arctic Circle for the first time in history to explore the potential for increased efficiency in shipping routes.

The greatest disadvantage of maritime cargo ships is the speed at which they operate. By far, maritime is the slowest mode of transportation. It is, however, the most efficient for the amount of cargo it is capable of carrying. In practice today, the speed of ships compared to air can have great significance when it comes to regulations and tariffs. As of January 2017 there were 52,183 cargo ships in service; so at any given time there can be thousands of ships at sea. If a sanction is put in place during a ship's 40 days at sea, the operators have to either turn around or comply with a tariff they were not prepared to pay. This has caused a lot of upset in the trade world recently.

Additionally, the carbon emissions produced by one cargo ship are equivalent to the emissions produced by 50 million cars. There is a continued effort to reduce ocean emissions by 50% by 2050. The closest alternative to maritime shipping is air shipping; however, due to current technological setbacks, air will not be taking over maritime for international shipping anytime soon.

Rail Transportation

First invented for use in the early 19th century, rail transport quickly became vital for the expansion of the western world and has played a pivotal role in the realm of logistics for over two centuries. In modern practice, rail is used more exclusively for the largest and heaviest payloads (bulk cargo) traveling across land. The vast majority of railway infrastructure connects highly populated areas with large unpopulated strips of land between them making rail ideal for long-distance and cross country hauls. Canada, for example, is very sparsely populated between coasts so anything shipped more than 500 miles often requires a rail transport.

Rail transport is confined to a more limited infrastructure than road transport. As a defining trait, locomotives (trains, monorails, etc.) are confined to a traced path going between point A and B with very few points of divergence. Railways are costly and time consuming to construct and only a few new railways have been constructed since the early 1900's. Additionally, railways are limited to semi-level geographic areas making construction increasingly laborious. Thus, railways are primarily only accessible in large metropolitan areas. This attribute makes rail one of the primary players in the intermodal transportation.

Within the confines of the railway system, the rail vehicle is not influenced by traffic, points of diversion, and switch offs between modes. This makes the rail the most dependable mode for making long hauls across land with minimal damage. Trains commonly carry bulk cargo items such as coal, corn, iron, ore, and wheat, items that would be uneconomical to ship by truck.

Intermodal Transportation (Multimodal)

Often in logistics, one shipment is completed using multiple modes of transportation. For example, consider a SMB in Germany shipping goods to the Oregon. Their shipment will most likely begin on road, be transferred to rail, then to maritime, which transfers to rail in the US, and then arrives at its destination in Oregon by road once again. The purpose is to take advantage of the individual strengths of the different modes, thus reducing costs. This practice is known as intermodal transportation and is often necessary in logistics.

Historically, intermodal presented many challenges for shippers and carriers; primarily, transferring shipments between modes with maximum efficiency and minimal damage. With the advent of containerization, intermodal has become much more efficient and safe. By creating a global system of standardized containers, warehouses and shipping yards can safely and efficiently transfer containers between road, rail, and maritime. The standard for intermodal containers is 8' wide and 20' or 40' long. There is no set standard for height; however, most containers average 8.5' in height.

In recent years, intermodal has experienced a substantial uptick. With rising freight rates and a shortage of available truck drivers on the market, companies are turning to other modes, primarily rail, to complete shipments. In a capacity crunch like this, companies scramble to see how they can keep costs low while maintaining fulfillment promises.

Conclusion

Each mode has its advantages and disadvantages for its role in the supply chain. A primary responsibility of logistics managers worldwide is calculating what the best mode is for a specific shipment. Each factor comes into play: volume, speed, distance, and cost. What traits are important to your company? Do you value speed over cost, cost over volume, volume of distance, or the exact opposite? By knowing what mode is best for your company, you can make the decisions necessary to grow your business and create a winning supply chain.