



SUPPLY CHAIN NETWORK DESIGN

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LESSON 01 – What is Supply Chain Network Design

Welcome to lesson one. When designing and optimizing your supply chain network, we typically have the following priorities in mind that could be cutting your cost, improving service time to customers, and parallel reducing your carbon footprint while measuring it. Establishing a current state of your supply chain is nothing but bringing together all your different entities of your supply chain on one single unified platform. This could include your manufacturers, your suppliers across the globe, your external vendors, regional and local distributors, and most importantly, your demand points as well as your end customer. As simple as it may sound, most companies do not have a visual representation or understanding of what their network looks like on a global scale. And sometimes this is the first time that they're actually visually seeing their map when they venture out on performing such exercises. When I'm most often asked to describe what do I do to a layman, this is how I generally respond imagine you want to expand or set up your company in a completely new region. How do you go about it? How do you decide the magic number of warehouses or DCs that must be set up, their location, their sizing and which customer is served by whom? We are supply chain designers or modelers who are responsible to provide the answers and guidance to these exact questions by using the framework of methodology based on informed assumptions and mathematical computations. Supply chains today spans across thousands of miles across the globe. It involves numerous suppliers, retailers and consumers and is underpinned by multimodal transportation and telecommunication networks. This is complex in nature and hence need to be designed by modeling the individual components in the network to either make like a centralized decision benefiting not just one department, but all the departments involved. Supply chain problems result in increased transportation and inventory holding cost, increase in labor cost, which decreases your operational efficiencies and which eventually leads to your customer dissatisfaction. The supply chain distribution network plays a major role in a firm's, competitiveness and sustainability goals. Here we will answer or we will help businesses answer some preliminary questions that must be repeatable and be able to be answerable in a precise yet in a repetitive fashion.

Some preliminary primary questions that we are trying to answer as a business or the business is essentially trying to respond to is trying to find the optimal number of distribution network which minimizes all your cost, that is, your sourcing, your warehousing, your transportation as well as an inventory holding cost. The next question could be how can I balance my supply chain cost versus your service lead time? This can become a trade off kind of a situation. It becomes very essential for a business to answer it. Sometimes you want to understand are there any pooling centers or cross docking facilities which you could leverage to answer certain questions? And lastly, businesses want to try and understand how do I align my distribution network to serve a particular client? This could be one of my major client and how to satisfy the service level agreement that you promised a particular client. Now, let's talk about what is the importance of supply chain design. One of the primary benefits of understanding or looking into the current supply chain network is visibility into the EndToEnd network spanning across the globe. Most often, business owners are in awe of the discoveries made during this exercise because it brings forward so many factual revelations about the network which paves the path for a lot more intriguing deep diving questions. For example, this exercise visually brings forth the nearest and the furthest suppliers across the globe. However minute the quantity, volume or frequency of the shipment may be, this can give the ability to peek into the past as well as a little bit into the future. It definitely is an enriching informative experience for many. While there is no optimal stage to optimize a supply chain network, it is most recommended to venture out on this exercise right at the beginning or while you're expanding into a new region because the majority of the supply chain's lifecycle costs, such as investments, your capital expenditures and directional costs are applied in the beginning. As per research and the statistical survey, about 8 to 30% of the sales operating cost is borne by the logistical operations cost As we can see here, this is a graph which was published by Gartner which beautifully represents the matrix and distribution of your strategic, tactical and operational planning and the respective values and solution and the percentage distribution of the same. To summarize the primary benefits of performing this exercise, this could include minimizing various supply chain costs, reduce and optimize your in transit inventory which includes your raw material, finished goods and work in progress material and your stocking inventory value volume. In addition, it also implies increase in profitability and service level to customers and reduce your capital expenditure and fixed assets by consolidating your warehouses, reducing the number of DCs and optimizing the size by location when needed. Now, let's discuss about a more recent example from the recent time how supply chain design could positively impact your business. So here is a simple graph showing the container prices of a 20ft equivalent unit container, typically TEU

from Shanghai to Rotterdam. You can clearly see how the Pandemic drastically impacted the pricing of container shipping. There were multiple factors contributing to this. It was shutting down of plants of some of the major regional players in the world, which created a pile up and backlog of containers, thereby not only creating a container shortage, but when this was coupled with panic, with the panic buying behavior from consumers, putting more stress on the already stressed out situation. We naturally saw a huge surge in prices for container booking and shipping as well as businesses were trying to build up their inventory to mitigate risk and the unpredictability in the situation. As you can see in the graph, you can see the surge in the Pandemic months. Now let's look at this other graph, which was published by The Economist. Since November, the cost of shipping a 40 foot container from Asia to Europe has risen more than threefold, which is represented by your red line that you see in the graph right here. While the cost from the price of shipping goods from North America to Asia has doubled. As per The Economist, when demand picked up again in the second half of the year and factories started returning to fill up their production, thousands of containers were stranded in European and American ports rather than in Asia once where they were actually needed. This obviously had an immediate impact on commodity prices, which is what you see on this other graph right here. Because what really impacts your commodity pricing is your entire supply chain cost, because sometimes certain commodities are regional dominant and are dependent on your supply chain cost. When looked at this impact globally, the impact on developing nations were proven to be more than developed nations. Let's look at one more example. When the ever given mega ship blocked traffic in the Suez Canal for almost a week in March, it triggered a new surge in container spot freight rates. This was an all time high when compared to our Pandemic rates. The spot price for sending such a box from Shanghai to New York, which in 2019 would have costed around \$2,500, was now nearing \$15,000. Securing a late booking on the busiest route from China to the West Coast of America could probably cost anything between \$20,000. So now let's get to the point as to why I even mentioned all of these examples. We're trying to answer a critical question as to why supply chain network model probably would have benefited us in this situation. The whole point of having a supply chain network model is to be able to assist the business in making quicker and more accurate decisions by projecting and quantifying the impact on the network, which also gives the ability for the business to run multiple What-if scenarios to understand how the change would have impacted not just in cost, but also in terms of lead time and service time. This almost helps us in moving from a proactive to a reactive based approach or decision making. Having a well established model in place already really gives you the edge and your supply chain a much better

competitive advantage over other businesses. Because right now you're not making assumptions and you're not projecting What-if scenarios, but you have your numbers and you have your results quantified. For example, when there is a particular stress on a regional supplier, how would your cost be impacted if you switch to a tier two supplier? Having a model in place to be able to answer these questions simulated as well as trying to understand how my service time would be impacted, is the advantage that we would get by having a well defined or an optimized supply chain network. Thank you for sticking around for lesson one. I will see you in lesson two where we will talk about your strategic, tactical and operational planning and how they interact with each other.

