Logistics & Supply Chain Management

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Lecture 42 : Importance of Distribution in Supply Chain

Hello dear friends, welcome back to NPTEL online course on logistics and supply chain management. So today we will start discussion on very important topic which is designing the distribution network. Having said that important means why because this is the network which is going to ensure the final end mile delivery of the product and services. It is not only that through this distribution network you will deliver your product or services, but this is the point of contact where you are directly in touch with the end customer or consumer who is going to consume your product or services. So, that means when you are in contact with the customer recording their information, feedback, preferences whatever their preferences are so that is very important so this channel becomes important in that aspect as well right. So, we will spend couple of session on what are important factors when we will talk about you know designing the distribution network.

very basic concept here is whenever we are talking about designing distribution network so obviously we will keep some points in our mind right like points means what are the a set of services we are going to provide obviously when you are saying comparing your online distribution network or with the retail shop obviously two different set of you know establishments so both are providing different experience when you want to you know physically check some product feel some product or visualize some product so obviously you prefer to go to retail shop and then you are picking the product right so that may be the one advantage but when you are you know so overburdened with the day routine life so then you want to order because maybe standardized routine item you want to place the order to some maybe any platform and then you want the doorstep delivery so these are kind of services means extreme and and then you know when we are talking about e-commerce industry different level of services when we are talking about the long chain of wholesaler distributor retailer then this different set of services are there right so this is one aspect level of services the other aspect when we will pick our distribution network is the cost if we are talking means we discussed in the last session i think as well about the supply chain cost so total cost is your obviously the material cost material acquisition cost manufacturing cost your distribution cost your storage cost facility cost where you are setting up your distribution network these are some of the costs right but here we are going to discuss only about the distribution cost what can be the your distribution cost will be your logistics cost right so your logistics cost will be including

your transportation cost your warehousing cost your storage cost and facility setup cost right if you are setting up distribution center so that is one factor so cost versus level of services we will try to make the trade off between these two parameters and then we will say this is a kind of particular design ah distribution design we will go for right so then we will see the ah this distribution designing with a perspective of your online sales because now the online sales platform are growing like anything and we will discuss this discussion in the next session where we will discuss what are the different options available as when we are talking about you know considering all these parameters considering the impact of online sales then we'll talk about all those different design options and we'll evaluate those different design option with respect to cost parameters with respect to level of services they are providing right and then we'll end this discussion on designing distribution network with one beautiful case of dell right so quickly going through supply chain we know the complete supply chain, raw material suppliers, manufacturers and customer at one end right. So, in between those three major stakeholder we will try to manage the distribution, distribution of the product and services right. So, having said that ,that means movement of either raw material from the supplier to manufacturer or the movement of the finished goods from the manufacture to the end customer right. So, like I pointed out whenever we are making this decision of designing the distribution network we will consider cost and then what value we are delivering to the customer right level of services.

So, quickly going through one example Walmart when we are saying that the Walmart case study we have discussed in detail low cost. huge variety fair quality right this is their key tag line if you know just define walmart on the other hand if you will define dell very responsive supply chain where they are you know providing the customized pcs to the customers right if you talk about zara they are you know so quickly replenishing their design patterns so they are in that way very responsive they are not cost efficient cost efficiency is not main criterion which on which they are competing if you are talking about 7-11 Japanese store where they are you know changing the shelves so quickly and providing the merchandise morning if you will go you will get some other merchandise evening they will change right totally and they are also including the local merchandise as well so these different players working on different strategy, different distribution network. So, if I will say here that one particular distribution network is good enough to all the industries is not fair enough right, even if I will say one distribution network in one industry only not sufficient right, because if we will talk about Amazon, shop clues, Walmart, Flipkart, eBay, Myantra, all those players, Meesho, all those, ASIO, all those players are having different distribution strategies, right? So, one are hitting some parameters, other are hitting some other parameters, right? But only thing is broad concept will take care is one hand your cost parameters how you are affecting other hand your level of services you are providing to the customer so saying that level of services

that means what can be the factors obviously when we are talking about level of services to the customer one is response time how much time you are taking to respond to customer query then product variety product availability whether your distribution network is supporting huge variety of the product or you are keeping limited product variety because you want to be cost efficient so you want to cut down the inventory cost right product availability whenever you are visiting my retail shop you are always finding the availability of the my product right that means i am in managing that inventory of the product but if I am not if I am cost efficient obviously maybe sometimes I may be out of stock customer experience if customer is visiting my shop and they have picked I am not talking about online store I am just talking about the physical store if you are visiting let's say Spencer and then you are picking all the items and after billing you are asking them you deliver this these boxes maybe two three boxes at my doorstep if they are doing that that means customer experience is enhanced in the offline retail store as well where you are seeking for doorstep delivery time to market is another parameter that means today you are launching the product or services and when it is available for the sales in the market so if you are launching anything very simple concept online at the moment you are launching everything is available in the market but if you are just imagine somewhere product you are launching in Delhi how long it will take to reach in calcutta kharagpur or other geographical regions order visibility and you have seen that when we are going through online so we are tracking where is our order returnability is very very important concept whether offline or online any issue with the product quality it should be our distribution network should support that that return should be easily processed it's not that only you are accepting the product you need to you know again credit back to the customer right so that depends upon distribution network with the shorter response time can provide faster obviously shorter response time means faster delivery larger product variety more options to the customer which type of distribution network you are opting for So, when we are designing we need to take care of two broad phases first one is you visualize the broad structure of the supply chain network right and second is broad structure means whether you are opting for offline store where customers will now this again I am saying that there is no pure one strategy. So, if I am talking about let us say furniture market. So, furniture market is something unless you will not actually feel the product and then you are going and then feeling the wood quality and finish and the color and the whatever whatever you know parameters are there you will not you know finalize the furniture because that furniture will be with you for next 15 20 years at least right this is the average right so that means what is the broad structure if I'm talking about some routine grocery items always I'm using Tata salt let's say so Tata salt if I'm buying offline or online how does it matter so as long as that packet of salt is reaching safely at my doorstep I am ok with that right.

So, once that broad structure is done then you will convert that broad structure into

specific equations right. If you are going through offline you need to set up store in Kharagpur, but if you are going through online you are accepting online order only and then delivering at my doorstep then you can be in Calcutta, you can be in Delhi, you can be in Bangalore, Ahmedabad anywhere you can be. you can be overseas as well you need not to set up those facilities right so choice of distribution network can have a significant impact on the profitability and that becomes your USP as well so if I'm saying Dell why Dell is so successful because they are providing you the customized product. How they are doing that? You visit their website and then you can add your features, your requirement, your configuration and then they will deliver you through their local retailer. still retailer they are managing earlier they were not managing retailer even but then they thought that because some standardized products are there where we maybe we need to go for you know high responsive rate we need to go for right so then it can be done only when we have localized retail store So, the main point here is you should whatever distribution network you are picking you should align it with your strategic goal and your strategy is cost efficient then you need to pick the distribution network which is hitting all the cost parameters.

quickly we will go through service parameters like we talked about ok so customer what customer is looking for response time whether customer is ready to wait here very simple concept is if you are dealing with some may be very customized kind of products right So, then even if because you cannot produce unless customer is giving the you know requirements. So, that means in those kind of customized product customer is ready to wait for some period of time, but if it is not kind of you know very regular or standardized product obviously I want very less response time. So, that quickly it can be delivered. Product variety. what type of variety is required so if very standardized product in steel road in sugar industry in salt industry those commodity products what extra you will do with the product there is very less variety right but when we talk about automobile industry so i talked about maruti suzuki right where in petrol they are you know Vxi is there Lxi is there then next model of Lxi then Vxi next model of Vxi then Zxi next model of Zxi so that means minimum six models for petrol version then six model for diesel version then six model for hybrid version six model for electrical version and this I am talking only about one color now let's say if these are six 24 different models are there then if I am having 2 colors 48 if I am having 4 colors 10 colors 240 10 colors 240 models then 240 models one engine capacity is may be 1200 cc other engine capacity may be 1600 cc so just you double the number right so that means that product variety it is very difficult to maintain offline right so if that kind of product so then you can maintain it online whenever customer is ordering that product Maruti Suzuki will take minimum 2 months 3 months you know waiting time and then they will process the product accordingly but standardized product may be if that middle model may be VXI is very famous in that particular model let's say Grand Vitara so then you may be getting

very you know quick delivery Product availability is another feature that means whenever you are visiting my online store or retail shop huge availability of the product, so always in stock but then you compare online versus offline, so let's compare the parameters online versus offline it will be better to you know understand the rest of the you know design options.

so online if today you are launching the product today it is available in the market and just you need to click the pictures of the product different product different colors and inventory is maintained only virtual inventory you are maintaining so that means anytime customer is visiting that you can show the availability but sometimes we are seeing that because if that we are depending highly on some third vendor like let's say if you are talking about Apple iPhone So, usually you might have seen the model which is you know in huge demand. So, sometimes these Flipkart or Amazon they are out of stock, they are showing out of stock right. So, that happens when that high demand for particular products are there or seasonal offers are there. So, people are consuming more than actual demand. So, then that may happen, but maintaining high product availability during offline is big challenge because that inventory you cannot handle.

customer experience if you are ordering product on my website so I'm delivering to your doorstep your customer experience is enhanced if I'm giving you option to customize your product that your experience is enhanced so that means online but if you go to retail shop maybe you will get only standard product so there you can compare time to market today I'm launching the product online it is available everywhere every corner of the world wherever you are delivering that product but offline it will take time may be 10 days 15 days 20 days to reach that inventory to the end level order visibility obviously is very important when we are talking about online and online because many players . You get the updated information now your product has reached somewhere in the Gurgaon facility hub and then it is transported to Calcutta it has reached to Calcutta hub now it is reaching to may be Kharagpur then today it is out for delivery all that information is there but .when we are talking about offline store that information if you are placing order for something and you are waiting for that that level of visibility or may be digital platform we are not using right returnability ,returnability in obviously online store the high rate of returns 25 percent to 30 percent rate of return and we have talked about this in e-commerce session when we talked about that somewhere maybe around 60 to 70 percent of the people or customers they are just before buying any product they are checking whether the return option is available or not so these are some of the parameters where customers are evaluating different distribution network services level now to provide those services obviously we are maintaining inventory that is cost we need to transport whether you are transporting to retail shop or you are transporting to individual customer

home so obviously that cost will be higher facilities and handling in between warehouses are there distribution storage are there or if manufacturing is companies managing the inventory so that cost will be there information obviously that information network platform you need to develop like amazon flipkart walmart they have developed or any website right where you can you know enter your order detail where you can get the information of the product pricing policies everything you can get read So, these are the four parameters or drivers we have discussed which will impact obviously these will also impact the sourcing and pricing also what you are how you are delivering and what product you are delivering will impact your pricing strategy as well. so quickly we will go through what are the relationship between these parameters and what will happen if we will change you know one parameter how it will affect other see if I am increasing the number of facilities so response time is very less this is let's say T1 so number of facilities are N1 let's say but if I am reducing the number of facilities you can see the response time T2 is very very high so that is quite obvious see that means I am having this facility in Kolkata right so now through this centralized distribution network I am covering let's say almost 700 to 1000 kilometers area all around right so these different markets I am covering So, obviously that means only one facility is covering around 1000 kilometer area. so thousand kilometer in one direction so if ten direction ten different markets or hundred different markets or five hundred different markets number of facilities are less so obviously thousand kilometer when you are shipping the product it may take three to five days to deliver the product simple but if I will say put facilities near to all those markets so now only may be I am covering fifty kilometers or less than that so less than that means now response time customer is coming to me quickly I am delivering the order that is the relationship between number of facilities and the response time but the other thing is when we will increase the number of facilities obviously inventory cost will increase because now instead of managing inventory at one location in Calcutta now we are managing inventories at hundred different markets or locations right so that means those many facilities you are setting up so number of facilities are increasing inventory cost will increase because you are maintaining inventory at different locations another very beautiful relationship of number of facilities with transportation cost now this I have discussed very basic example let's say one network structure is like this here is manufacturer and here is distribution or fulfillment center, here is customer.

Let us say this distance is 100 kilometer, this distance is 10 kilometer. The other structure is where this distance is 10 kilometer and this distance is 100 kilometer. Now, this is let us say for distributor this is your inbound logistics cost. Whatever is coming in that is inbound logistics cost. cost and whatever you are shipping out of your company that is outbound logistics cost, right.

So, now you see when the always inbound logistics cost is higher than the outbound logistics cost. That means we need to minimize the outbound logistics distance, how it can happen when When we have more facilities near to end customer, earlier we were covering 1000 kilometer, now we are covering only 10 kilometer. So, that means outbound distance has decreased and because outbound distance cost is higher than inbound, so we can minimize the cost. So, this is how number of facilities will increase, so transportation cost will decrease first. Why it is increasing after that point? Because may be after that we are not able to use the economies of scale concept because let us say if one truck can carry up to this may be 10 ton.

So, after that may be we are hiring small trucks and they can carry may be 2 ton capacity let us say, but because our customer is only ordering may be less than somewhere 1 ton or 1.5 ton that means that capacity we are not able to utilize fully. So, there the per unit cost will increase that is why after that if we are including more number of facilities so that it will shoot up the cost. another very simple example why your outbound logistics cost is higher than inbound let's say we are shipping furniture table so if I will ship the finished table maybe only in one truck we will ship maybe not more than 10 or 15 or 20 tables depending upon the capacity of the container right but if I am only shifting in you know if I will disassemble that table and then will shift maybe I can shift for more than thousand tables material and then at the customer end again it can be assembled with minimum effort because already we have assembled it and then so you might have seen in when you are placing order in Amazon or Flipkart some of the items you need to assemble again right so this is example how you can reduce the outbound logistics cost. so these example orally I discussed another example for amazon warehouse what they are doing they receive full truckload shipment of books on the inbound so they are setting up small centers near to the customers because customer are placing order for one or two or three books maximum right so that way you need to cover long distance to cover many customers you are not getting order from one library where you need to drop all the books then it is fine then you can increase the inbound logistics cost distance but when it is you know like that when segregated orders are coming from different location So then what Amazon warehouse they are doing they are extending this inbound logistic cost where they are you know consolidating large number of books in one truck and then they are maintaining inventory somewhere distribution storage near the customer and then they are finally delivering it right.

Another example, number of facilities, facility cost. Obviously, you have 2 facilities this cost, 3 facilities this cost, 4 facilities this cost, 10 facilities cost will increase. So, that

facility cost will increase. So, number of facilities that fixed investment is required. So, these relationships are very important.

Now let's plot the total logistic cost. Total logistic cost is like this and will include your facility cost plus your transportation cost plus your inventory cost. This is the total logistics cost and other cost we can discuss is about information cost. that we will discuss when we will discuss about the you know different distribution network designs right but here the logistics cost is facility cost inventory cost and transportation cost so this as long as you are enjoying the economies of scale the cost will lower down with the number of facilities ok so but if you will increase further the number of facilities your cost will increase because that full capacity of the truck may not be utilized. And response time already we have seen you can see this is the point where you can minimize the total cost as well as you can minimize the response time as well.

So, you can say these many number of facilities are may be the right decision to go for right. where you can minimize the total cost and also you are maintaining fair response time that customer need not to wait that much where they start shifting to some other vendor right so what are the design options for a distribution network we will see One is direct shipping, direct shipping means manufacturer or any supplier is storing the product, you are placing the order online and they are directly shipping the product. This is maybe Dell, you can take the example, you can go on their website, you can give your preferences, your configuration, they will deliver the product at your doorstep. so now they are delivering through retailer also so best the beauty of this direct shipping is all intermediaries are removed that means retailer wholesaler distributor carry forward agent that long structure you are not following so you can cut the cost as well you have control over the quality as well right centralized distribution which walmart is known for doing that where they are maintaining inventory in the center and distributing from there to every market right so then you are minimizing the inventory cost you are more cost efficient in that way. Decentralized distribution when you are like example we talked about so that is another option you have that you want to be very near to the customer so that immediately product can be shipped can so that we can minimize the response time but you are increasing the inventory cost.

So, these different options I already initially told you will you know change the parameter whatever option you will pick will change the parameters cost parameters as per that. cross docking what is cross docking we discussed about when we are not storing in the warehouses only temporary storage is being done let's say this is the location up to this we utilize the full truck capacity right from point a to point b but after point b may be many different locations are there So, may be from here also truck is coming which is

utilizing the full capacity now we need to you know some product this is one market let us say this is one location. in Kharagpur this is Kharagpur KGP now some products are coming from this truck some products are coming from this product may be some are coming from some other seller right so here you will not store you will just ship those product in smaller truck and consolidate all the orders going to that location of Kharagpur right so this is how you are doing the cross docking drop shipping you place the order online they will drop the product in your door step right, so in that way if drop shipping can be best you know performance criterion when you are maintaining inventory at a manufacturing location only and whosoever is placing the order you are delivering direct to the customer and customer experience is also enhanced because they need not to waste time but then again if we are talking about the customized kind of standard products you can go for drop shipping but if it is kind of a customized product right or maybe where variety is used where you want to see the product then this drop shipping will not work hybrid distribution where you can use centralized as well as decentralized some of the locations if Many orders are coming. You can enjoy economies of scale. You can go for decentralized.

Maybe one location from Calcutta is Midnapore and another location is Kharagpur. Maybe Midnapore the population size is huge. So they can utilize the economies of scale. Let us set up one distribution center in Midnapore. But the other location is Kharagpur where the so many orders are not coming.

So, let us say let us serve it from either Midnapore or from Calcutta. So, whosoever is nearby location we can go with the hybrid. Hybrid can be like offline as online also right like what Dell is doing offline also and online also right. third party logistics provider this is we have discussed in detail first party to sixth party logistics provider where you know if you are not sure about the orders scalability you need to scale down scale up where you are not sure about the market where you don't have expertise with the logistics activities you don't have the courier partners then you can outsource this right now we'll talk about online sales and distribution network obviously providing you the opportunities In terms of huge access to the market, so that is one biggest opportunity when you are going online, but the challenge is when we are saying huge access to the market that geographical reason you need to cover with your online distribution network. So, how we are doing that? Fulfillment centers are there which dedicated fulfillment centers warehouses are there.

If I will place the order may be from Flipkart. So, Flipkart is having fulfillment center nearby me in Kharagpur or in Calcutta and my order will be processed through there only. Inventory management. Inventory management now see when we are talking about

online stores usually we have 2-3 option one is inventory led model another one is zero inventory model and third one is retailer storage model. Sometime what is happening inventory led model is like you have your fulfillment centers Amazon is having fulfillment center may be in Calcutta and customers are placing order nearby may be Calcutta fulfillment center is covering 500 kilometers from there they are fulfilling the orders.

This is how Amazon is maintaining the inventory. and then they are you know shipping the product another is zero inventory model where amazon is not maintaining any inventory in the fulfillment center what you are doing in the other option you will as soon as you will get the order you will process it from the manufacturer and then you will supply it through cross docking or whatever you are doing retailer storage inventory what i will do i will tie up with the local vendors here in kharagpur Whosoever let's say I am buying AC Hitachi so now I want to place order through flipkart because those seasonal offers are going on if I will go maybe physically on the store maybe those offers cash back and those things or maybe EMI I will not get easily right so I want to buy online. Now when I am buying online so obviously shipping product AC from Delhi to Kharagpur will be difficult or from any 500 or 1000 kilometer location. So what they can do is retailer storage inventory is where retailer will store the inventory whosoever is the retailer of the Hitachi they will ship the product. So, we have you know tie up with that.

So, this is inventory management. Last mile delivery is also very very important where you know this is the last end leg of any you know services or manufacturer provider right where you are you know delivering the product to the end customer. Order processing and packaging as soon as you are getting the order, you are picking the order in the warehouse, you are packing it and then you are finally doing the shipping process. Return management is very important in online and we have seen that because tendency of buying online is used because without any reason we can return. So, that we need to ensure through effective return management process, so we need to handle the return and then see this is also very important, we are maintaining the inventory of the finished goods in our warehouse, but whatever you know unused product is coming because customer did not like that is also inventory, we need to update that inventory as well, technology and automation Huge investment is required when we are talking about online retail store, right? Warehouse management system, your distribution routing system, right? How you can make the end mile delivery, right? Keeping the customer informed, that will happen only when you have technological and automation system.

customer experience obviously you can provide only positive customer experience when you are giving them returns also all those you are hitting all those parameters we talked

about in customer services and when customer is not feeling happy with the product they can easily return that product scalability and flexibility So, your distribution network should be agile or flexible enough if those orders are coming those many you can process minimum orders are coming you can process that as well the best example, always I code you right now may be IIT Kharagpur campus the people living here may not be more than 5,000 but you just imagine after 20-25 days it will raise to somewhere 25 to 30,000 ,when all the students will be back so see this is how you know this population is and then you just imagine the number of orders will be placed or Zomato or Swiggy so that is obvious integration with physical store is best option when you don't want to maintain the inventory you just process the order Zomato they are not at all maintaining any inventory, they don't know how to cook, they don't know what are the different recipes, just tie up with the storage, local vendors, restaurants and start delivering the products. Ola is another example. Data analytics, this is the main property of online store, so when they are selling through online, usually because of those seasonal offers and all those things they are suffering from the losses where they are making money they are making money because of this information data they are collecting how customers are visiting their website what is the footfall rate how many product they are viewing so that target advertisement can be done and then on their website you can highlight your brand and then all those things are there right so data analytics is one very you know strong field which is promising high returns for those players what will be impact of online sales on customer services if you are talking about physical product response time will be higher today you are placing the order it will take minimum 2-3 days to deliver right but digital product just now you buy the your this antivirus within no second you will get the key and you can install right product variety online huge variety can be maintained only you need to maintain the photographs only you need to upload the images right physical inventory you are not maintaining where the cost will be product availability you can show high product availability because through online customer experience 24 into 7 so today whole day is packed and i got free around maybe 9 o'clock in the evening 10 o'clock in the evening i suddenly realized oh I don't have for tomorrow morning breakfast I don't have bread and butter so how I can place order with Amazon fresh and I will just give them instructions as prime customer tomorrow morning by 8 o'clock I need my bread and butter so 24 x 7 if I will start searching the retail shop at that time may be I will get the one but may be then bread will be out of stock butter will be out of stock that also can happen Geographical reach, so if you are maintaining the distribution network that is another challenge. How to manage distribution challenge in the rural network where minimum orders are coming. Personalization, you can give your recommendation and tailored products can be provided to you.

Faster time to market. already I told you today you are launching tomorrow the product is available for sale impact of online sales to customer services order visibility you can

track wherever your order is returns are easy direct sales to customer feedback because you are interacting with the customer directly on your platform so you can get the feedback as well right Flexible pricing and promotions that happens that you can see during big billion days prime Amazon prime days all those things are going on seasonal offers are there and then they have seen the fluctuation of 50 to 60% rise in their demand of electrical products or home appliances or mobile phone specially right. So those seasonal offers attached with you know some festival seasons are there so those offers are there. Efficient fund transfer on online, if you are placing order now or receiving order now, if it is cash on delivery, just you will receive product once you have done the payment. That means easily you can liquidate the assets. But offline, sometimes you are selling on credit, bad credit can happen, so those things are there.

on cost inventory cost because you are selling through one store you can aggregate the inventory in the centralized locations and then serve the product and services to the different location but if you are having you know fast moving kind of items like amazon you know books which are you know in great demand So, then they are maintaining huge inventory near to customer. But if those which are having low demand, they are only starting the printing once they will get the order. So, postponement is also possible in those products when you are selling customized product like Dell is doing. Like Amazon print low volume books like I quoted right. So Dell will start assembly once they will record the order.

Facility cost, network, centralization if that is there will reduce the cost and if you are utilizing the existing network then also you can lower down the cost. You can see Netflix operates from about 50 warehouses whereas Blockbuster is having more than 1000 retail stores. because they are directly going through physical store operational efficiency will be higher when you are not maintaining inventory at different locations so then it will be higher handling and delivery because you are maintaining inventory only at the centralized location so and then you just see But in this case when we are talking about online or offline you see if we are having grocery store specially for grocery item I am talking about usually we are going to Spencer, Big Bazaar or any other mall right. So then we are picking the product, we are putting in the basket and then we are standing in the queue for billing purposes. So that work usually is done by any local retailer you are going, Kriana store you are going.

But here you only are picking your product. the experience is also enhanced because directly you are you are all the products are displayed there right so that experience is also enhanced and i am minimizing the cost also because now i am not picking the product my customer is picking only i am doing the billing part right so impact on online

sale on cost transportation digital goods can be transported means easily no cost will be there but non digital products again so if you are aggregating in the inventory then it will reduce the outbound logistics cost but if you are processing the individual order so then it will increase the outbound logistics cost information cost you need to set up very strong in information system so that visibility of the order can be enhanced you can track the order easily and then infrastructure cost will be there like amazon acquired zappos we discussed this case and then they once they acquired they got access to 1 million products more than 1 million products to manage those 1 million products on their website they need to upload more than 2 million photographs on their website. So you can see how these decisions will affect the services levels and cost factor. So in the next session we will explore what are the different options we have and we will discuss about the positive and negative of all those options. the maximum content for designing distribution design network so you can refer this book of supply chain management strategy planning and operation by Chopra and Mandel so that's all thank you very much