Logistics & Supply Chain Management

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Lecture 25 : Objectives of Supply Chain Networks

Hello dear friends, welcome back to NPTEL online course on Logistics and Supply Chain Management. I am Dr. Vikas Thakur, Assistant Professor, Department of Humanities and Social Sciences, IIT, Kharagpur. So, now we started discussion on supply chain management and we discussed the different three different streams in that overall supply chain network right and what is the importance how these those three different streams are interconnected and in that way we need to ensure the integrated you know all those three streams so that the overall the customer experience can be enhanced and the quality of delivering the products and services can be improved right. So, today we are here with we will define what are the different objectives when we are talking about supply chain management as complete functional unit what for what we are striving for and then we will talk about little bit what are the factors when you are you know going for designing different supply chain networks right and then i have come up with one very beautiful case with the case of zara how they are managing their supply chain in that way they are saying that they are responsive and they are designing the you know pattern in that way that they are replenishing their inventory so quickly that updated designs are coming through their supply chain so this is the content we will cover in this session right so quickly we will go with the objectives of the supply chain so obviously objective if i talk about the points are coming from the customer end and those are coming in terms of their expectations .Expectations in terms of delivery when they want how much quantity they want what quality they are expecting what variety they are expecting how much they the overall experience of delivery they are expecting how they are expecting the return policies and the features of the products and the quality all those things are coming as you know one kind of information to us as a product or services manufacturer right and then we are here processing those that all information designing the physical prototype in terms of product and services and then we are defining ok for producing this particular product i need to tap up with these many vendors to ensure the raw material supply all togethers open up new you know performance matrix where we will find out how our suppliers can be more efficient how we can improve their productivity so that the raw material cost can be decreased how the stakeholders like transportation different transportation functional unit can you know improve the cost performance and delivery performance and then warehousing how we can do that so if talking about all the objectives of complete network We need to include all the

stakeholders this is very clear and all those stakeholders are targeting to meet the demand coming from the last stakeholder of that supply chain which is consumer or customer.

So, quickly we will go through these different terms looking for sources of cost and revenue. right now I told you the everything is starting from the end customer in the supply chain so revenue will come from where from the end customer only right so cost how you will define the cost function Obviously, what expectations are coming from the customer will help you to define the cost in terms of because expectations you will record of the customers and then you will say these many features you need to add up. right this is how you need to prepare the product and then these many you know features quality variety all those things you need to ensure this will you know develop the cost function of producing and delivering those product and services to the end customer so that the revenue will be generated from the end customer maximize the value generated this is the difference between the cost paid by the customer and in experience in occurred it's not only now customer is evaluating for your product whatever you are delivering now the customer is also evaluating for the delivery services how you are delivering right so because when you are delivering the product and you are kind of very misbehaving with the customer customer will hardly place order with the same retail shop or distribution channel or will immediately will complain against that courier partner that he did not drop the package at the doorstep and he asked me to come downstairs and pick up that packet so that is this is you know the overall value you are creating for the customer so that this is one way how you can enhance the customer experience then improvement of cost of quality we talked about that quality is free in that session so quality is free means cost of ensuring the quality and then you will talk about the if you are not ensuring the quality the appraisal cost is not there when you are not ensuring the quality the products will come in terms of warranty guarantee and then you need to fix all those things so that cost will be higher than the cost of quality right so that you need to take care another objective is that how quickly you are replenishing the product it's not only replenishing the raw material inventory from the supplier it is also how your distribution network your retail shop if you are operating through a particular retail shop how quickly retail shop is you know feasible to replenish the stock and that will only ensure if your complete supply chain is so responsive that whatever record orders you are recording from that particular retail shop are supplied timely right. speedy delivery is obviously again objective of the supply chain how quickly you can deliver the product and shorten that time to order so when I am placing the order and if you are saying tomorrow you are going to get the order it's good enough but if I am talking about something medicine I want that delivery within half an hour within one hour right that much long we cannot wait so then we are talking about some kind of emergency supply chain right so that it's not that now regular items what we are purchase purchasing we want that emergency kind of experience because we we are not planning in that way we are so busy with our

whatever routine stuff we are doing and then suddenly we want the inventory should reach our house right so that is one point efficiency and efficacy efficacy how effectively you are producing the product how efficiency with minimum cost you are delivering through your supply chain so delivery optimization that can happen when you can you know one thing is you can consolidate order from multiple customers right if you are promising 30 minutes pizza delivery so then you need to see from IIT Kharagpur how many orders are coming so maybe another 5 minutes I will bet even then I will reach all those 5 orders doorstep I will reach on time so that 5 meters maybe 5 minutes I can consolidate maybe 2-3 more orders right so in that way delivery optimization this is one way other way is finding the best route utilizing the proper container capacity more awareness in terms of supply chain efficiency and dynamics how the things are operating in the outside world how you are recording and responding to that and then only you can ensure the overall performance of your supply chain inventory optimization you need to ensure outflow inflow of the inventory inflow whatever raw material you are acquiring how you are keeping how much you are keeping and then in the distribution chain how much raw material you are keeping right so that will ensure you to balance the demand and supply but yes this is the basic purpose why we are keeping inventory.

Inventory exists because there is gap between these two supply and demand that's why we need to keep the inventory how you can minimize the gap when you have that integrated information system whenever order is coming your production facilities can be fed at the same moment with the raw material can be produced within no time can be shipped to the customer and if you are near to your manufacturing facility is near to customer then it will help you to reduce the time to order. time right. Flexibility, flexibility if something is coming from the market and you need to react on that may be in terms of changing the process, may be in terms of providing the product quality, may be in terms of adding some new features, how quickly you are doing that, how flexible your supply chain to you know to opt to adopt all those changes dynamism coming from the market. So, business characteristics whether you are operating at macro level or micro level. So, if it is you are shipping your orders in large quantity then you can talk about that may be.

efficiency and effectiveness right when you will ensure the complete utilization of your capacity but when you are talking about within few minutes delivery so then I think that is another business characteristics where you are you know the basic USP is you are feeding to emergency supply chain efficacy already I talked about how you are manufacturing the product but how efficiently you are manufacturing so that is your the scope is different efficacy is only related to how you are manufacturing the product, only that scope is limited right. So, cost reduction if you are efficient, you can ensure the

proper utilization in your warehousing, raw material supply, inventory, transportation, obviously the overall cost reduction can be ensured right. Better decision making, now this decision making again because information is coming from the market, but then the may be the top level management or middle level management will make this decision whether you are going a kind of growth strategy. If growth strategy, so obviously you need to expand your network. Expand your network in terms of distribution network, in terms of your acquiring the raw material as well, in terms of expanding the capacity of your manufacturing facility.

So, that better decision making will be there if you are having that information, access to that timely information and accurate information. Only then better distribution can be ensured when you have that better information from the market. So, then quickly that can be channelized your inventory can be channelized to the customer. So, here is one small video we will see how capgemini is promising. that what type of supply chains are required these days and how you can make it more efficient, what are the demands, what are the objectives of any supply chain, how we can use Capgemini solutions to make it more effective and efficient.

so here I have included some video links you guys can just quickly go through these videos so you can see through this video what are the you know the expectations are coming expectation level is growing like anything from the customers and to meet those expectations capgemini is promising that ai enabled solution where real time tracking information recording and information sharing can be done and decision making automated decision making can be done right so in that way you need to come up with your intelligent supply chains right where supply chain systems softwares techniques are automatically they are taking decision based on information right so in that way will be more accurate so now these objectives how we will fulfill these objective obviously we need to ensure the complete supply chain network and this network is interconnected all the organizations interconnection among all the organizations like your whatever facilities or activities or resources are involved right So, if I will talk about interconnection of organization, raw material suppliers, transportation agencies, manufacturing, co-manufacturing units, distribution partners and customer. So, integration of all those. If I am talking about activities. raw material production, shipping, storage, production of raw material means converting of raw material into finished one, again distribution, warehousing, transportation, final end mile delivery, these all are activities. resources this all resources are flowing through that supply chain right.

So, this network you can you know characterize any supply chain network with these three parameters what are the facilities are involved, stakeholders are involved, what are

different activities we are doing and what are the resources those are flowing through these different supply chain network and your resources you we have you know generalized those resources in terms of goods are flowing information is flowing and then finances are flowing through that distribution network right so to ensure that smooth supply the process of building and modeling your supply chain modeling your supply chain as per the you whatever your understanding of you know the requirements if you talk about the intelligent supply chain keeping aside the cost and time required what intelligent supply chain is extra doing so how quickly responding to customer requirements whenever customer is placing order how you are recording those orders and immediately shared with the manufacturing facility automatically in the manufacturing facility it is taken decision that now we need to make this particular model because the demand is coming up So, this supply chain network will cover all the aspect. So, cover all the movement and storage of raw material, work in progress inventory, finished goods from the point of a reason to the point of consumption and it covers planning, implementation and control of supply chain operations. So, key component already we talked about these are the key stakeholders included in any supply chain. So, when you are designing the supply chain, you need to first fix the number of these stakeholders, how many distributors are there, how many transportation agencies are there, warehouses are involved, if third party warehousing you are taking, then how many your raw material vendors are there. Then because supply chain may vary as per the complexity and we talked about the steel industry where may be steel industry is where the ore is coming from one supplier and directly steel rods are supplied to the end retailer and from the retailer customer is picking up as per the requirement right.

This is steel industry very simple supply complex supply chain when we talked about automobile industry. where we are using so many different raw material components you talk about hospital industry example of services industry where the services are also required sometime you are going for test sometime again you are going for test so many different medicines are required so many different medical equipments are required emergency services are required those way those kind of services are also very sometimes that supply chain becomes very very critical complex immediately you need to shift the patient from this hospital to other hospital taking care of the information whether the other hospital is having that availability of the maybe ICU availability of the blood group required availability of the medicine availability of the doctors expertise all those things in that way how complex it is right so depending upon the complexity then again you need to design the your supply chain network in that way scale if you are transporting or delivering fixed order quantity right in terms of quantity or that is very fixed like steel roads if you are supplying to the market you are very much you know matured in that market and then you can figure out the demand. so stock out and excess stock means that you can manage in a very you know precise manner but we were talking

about kind of hospital services may be for 5 hours there is no demand for the ambulance for next 5 minutes you immediately you need 5 ambulance So, how you are manage that? So, in that way the complexity and you know scale of the operation require means have put different constraints on designing the supply chain network right. So, any supply chain we are designing. we are looking for optimizing the processes enhancing the collaboration leveraging the technology to improve the visibility through the supply chain how the product is moving if we are talking about hospital industry we need to talk about how the patient is moving from one lab to other lab from lab to ICU from one hospital to other hospital that also we need to take care during that channel how we are maintaining the health of that patient right that also is important and then we need to minimize cost reduce lease time mitigate risk on the bay whatever it is coming and enhance the customer overall satisfaction experience right so these are some of the parameters when we are talking about designing the your distribution network these will take care now these are some of the decision we will make facility role what role facility will play if you are talking about warehouse which is you know storing the finished goods so warehouse you want to keep your warehouse near to the customers right near to the market so that immediately demand is coming you can you know fulfill the order but the another problem with keeping the facility near to the customer may be the cost will be higher of facility location if you are picking up the location facility in the heart of the city obviously cost operational cost will increase acquiring that facility land that will be you know costly in terms of if you are keeping it little away from the city So, then facility location in that way what are the locations you are picking, capacity allocation how much capacity not only today what is the requirement, tomorrow just now we talked about if we need to expand our capacity whether we have that feasibility of expanding the existing capacity.

So, that also we need to and then from if we are having these factories, factory 1, factory 2, factory 3, n number of factories. market 1 market 2 and there are so many market so first factory may be will be supplying three markets second factory will be supplying these two market may be nth factory will supply depending upon so many different factors so that also you need to decide depending upon the first is distance transportation cost how much you can reduce second thing is if there is emergency demand can you shift from one supply to other supply source you have to because the one supply source may be may be shut down may be breakdown happened or something goes wrong with one supply center so you need to go for the alternate supply center right so that these are some of the important decisions when you are developing your supply chain networks What are the factors which will influence your this decision? We will go through quickly these factors strategic factor. because once you will set up your warehouse anywhere right or your manufacturing facility or you have located your vendors you cannot change so frequently your vendors right this is for sure so that's why this strategic factor is very

very important because this includes long term investment let's take any example that simple example cost leadership now i just talked about uh the property or the retail showroom you want to open within the heart of the city So, you cannot be in that way cost efficient. So, may be if you are 2 kilometers away from the city, you will get the cheap location, you will get the operational expenses will be little lower in compare to the where you know the costly location I am talking about. So, in that way you can see this example electronic manufacturing industry Foxconn or Flektronics they what they are doing they have find the this low cost countries like China where they have located maximum facilities.

because they want cheap location from there they will transport material to all the possible markets wherever they have explored right now in that way because now you are little away from the market so that gap is there so response time you need will be little higher if customer is demanding something it will take some time to respond to process the information coming from the market it will take some time there is gap again different strategy where they have your manufacturing location like portugal and spain where the cost of living is very high the location facilities land is also very costly but still they are you know they want to set up their stores or these production units near to the customer so that immediately they can come up with new trends and they can engage their customers right this is one very beautiful strategy zara is opting but again then that depends upon the nature of the industry what is the nature of the product you are providing whether you you are supposed to be near to the customer or even if you are away little bit away from the customer and you are supplying with lesser cost hardly matters if you are buying cement for manufacturing your house cement is coming from retail shop is located somewhere at very high costly area or at cheap location hardly matters right as long as you can minimize that cost because it is a kind of standard product. technological factors this is again important what kind of technology you are going to use will help you to decide whether you should where you should locate your facility this is very common example you might have seen recently our Indian government is also coming up with the schemes of setting up these facilities because semiconductor manufacturing facility is a require very high initial investment and it is a kind of industry you know you cannot come up with so many different stores because manufacturing facilities so you will may be you will come up with very high capacity limited number of manufacturing facility because initial investment is very high but then transportation cost will be you can somewhere you can see the transportation cost will be higher because from one station you are transporting the product to everywhere so that way the distance you are covering will be very higher on the other hand coca cola bottling plant it is cheap to you know initial investment required is very less right in that way so i want to minimize this transportation distance let us open small small bottling plants which can cover this market this market again one bottling plant here can cover

these three markets right so that means transportation cost here is important and i can set up my manufacturing facility near to the markets i can reduce the overall cost macroeconomic factors what are the taxes tariff exchange rate shipping cost all those things within that particular area right special economic zones where you are getting some rebates so you are moving towards those economic zones special economic zones right so those economic factors are also very important if you are getting the concession rates on the tariffs or taxes very simplified structure so obviously that's why now india has simplified the tech structure so that the foreign investment can be invited within the country and the manufacturing facilities can be set up because then documentation and all that is very tricky process requires more time and in that way your resources consuming infrastructural factors once you have ensured the facility but infrastructure minimum infrastructure is required right infrastructure in terms of road connectivity electricity water connection these kind of basic air force airport facility your train facility if you are dealing with those kind of logistics distributions heavy items so train is can be very cheap source right so that's why you can see still because in china in shanghai the location is costly but still many players are setting up their facility because they are getting those infrastructure factors political factors again if stable government is there you are in that way ensure that this government is promoting that particular may be industry real estate you are you know that way confident in investing into real estate they are promoting all the industries manufacturing industry within the country you are in that way safe right you so that you are calculating global political risk index so as per the risk scenario we will talk about the india position overall worldwide so 30th because of not only the political scenario sometimes some governments are favoring some type of industries but other you know disasters happens and mostly like of may be natural disaster are obviously there but then the agitations frequently agitations and all those things so then the country you know ranking is 30th position in terms of the risk competitive factors sometime what you do you want to locate all kind of stores in one market you might have seen furniture market right or all the goldsmiths are in one street only right so there what is happening there are two different concepts you can get the raw material easily because all are there only so raw material suppliers you can get easily right customer also aware that if you want quick meal short meal or maybe fast food this street is known for fast food you go there you will get all the products right variety is there fruit market vegetable market is example the other thing is kind of your organized one stop solution where malls are coming and there in one mall you will get almost all the products now this is for those people who wants to you know purchase the inventory for one or two months including everything grocery items your if you are related to your kitchen item washroom items or maybe related clothing if you want to try something so all those brands are there shoe brands are there other accessories you are buying so maybe in one mall if you visit you spend four five hours for two months it is done right so that is another concept so you need to take care of those things customer response time and local presence so if

customer is ready to visit so maybe you can provide the convenience store but if customer is you know if it is customer is ready to visit so then you can may be move your supermarket may be 5 or 10 kilometers away mall where they are going spending watching movie and purchasing all the stuff but they want very quick access to the inventory like milk products you are getting so convenience store so that means many stores you need to open near to the customer right so in that way another factor which is you know helping you to decide the location. Logistics and facility cost so this again important because from where you are transporting if it is in the middle of the city so transportation will be difficult right . Then you need to find out those timings when the transportation is allowed right so factory transportation and you are moving in large numbers so that also is important usually transportation cost decreases as number of facilities increases this is like this number of facilities are on x axis and transportation cost is on y axis. Now, why it is happening? there are two reasons first is may be here we are transporting 10 units here we are transporting 100 units here we are transporting 1000 units so that full capacity we are utilizing but after this it will shoot up because this was the maximum capacity of that container now we will go for another container so 110 items means again the cost will shoot up right another reason is if I am having the manufacturing facility or distribution facility near to my end market.

So, this distance outbound distance inbound logistic cost is lesser than outbound logistic cost. So, outbound distance I want to decrease. How you can decrease outbound logistic cost? when we are setting up our manufacturing facility or warehouses near to the customer. So, this example I discussed in the previous sessions as well. So, this is the overall framework of network design decisions.

first phase is supply chain strategy as per the global competition whether you are going for growth strategy means in terms of expansion strategy or you are going for stability strategy or you are going to acquire some business houses how you are going to compete right so that based on that your competitive strategy you will align your supply chain strategy if you are fighting with walmart obviously you have to be cost efficient so your competitive strategy is cost efficient so then your supply chain strategy what will be the implication implication will be you need to wait for the economies of scale you need to consolidate the orders you cannot run your vehicle to deliver one order because your basic strategy is cost efficient second is regional facility configuration so many regional factors we will consider like just we talked about what are the text structure what is the regional demand in that particular area we need to set up the new storage house there because many demands segregated demands are coming we can you know fulfill the orders from that political scenario what is the political scenario exchange rate demand risk right so what are the cost factors regional factors cost factor in that city right if you

will pick the location somewhere in that city what will be the cost competitive environment other players are also there in that right and production technology what are the technologies you are going to use Depending upon that, in the third phase, you will come up with the desirable sites. What are the desirable sites in Calcutta? So, may be four or five locations I picked. After that, all those alternatives I will evaluate with cost, other factors we with the factor like technology with the factors like local demand with factor like political stability exchange rate and the infrastructure parameters all those parameters whatever are relevant for your industry you will evaluate and will say that out of these five locations the this one is the best location third location is the best location and will set up our facility there only. So, these phase wise you can just go through Already I explained this and now I just want to discuss this case study of Zara which is Spanish largest apparel manufacturer and you can see almost more than 4700 retail outlets and their presence is in 76 countries. and they are dealing with those products where the demand is very very inconsistent uncertain and with that uncertainty they are saying that we are highly responsive whatever you ask for will provide you and how they are promising this because usually in that clothing industry apparel industry the design to sales cycle if you will talk about it will takes minimum of 6 months if you are coming up with new design and when you will deliver that product in the market it will take 6 months but zara has reduced this to 4 to 6 weeks only right so how they have achieved this because their main strategy is to you know renew the inventory in the stores as soon as possible and that is why 75 percent of the merchandise display they are changing every 3 to 4 weeks they are again not only replenishing the inventory new inventory new products new designs and because they have reduced this design to sale cycle time.

to only 4 to 6 week so every week some new products are coming right so when it is so they are matching the customer preferences it's not that after 6 months they are coming with the new designs so when because customer trends preferences are changing day by day so in that way zara is never out of season out of fashion so they are selling all the product at full price and because they are starting their production in collaboration with the customers after some recording they are initially they are producing very less you can see here it is mentioned 40 percent of the finished goods so. They are not producing those many quantity so that that extra inventory should not be there and in the end that you know seasonal sale should not be there they are avoiding that seasonal sale whenever there is seasonal sale obviously your competitors are giving 50 percent of 75 percent of but zara they are not doing that because they are collaborating with their customers recording their preferences so quickly how efficiently they are providing quickly and flexibly they are providing that product because they have these manufacturing in house manufacturing as well as outsource they have outsource as well this is very very unique strategy they are opting for forty percent of the manufacturing is still owned by inditex which is owning the zara brand right and they are producing in those you know costly

locations in Europe right and rest of that product they are producing in you know cheaper location in Asia. Now when they are fixed with the demand they are know that they are known that demand is going to be this much they are outsourcing that to the Asian locations for manufacturing but whenever there is uncertainty any new trends are coming they are manufacturing in house so that they can control the new products and coming up with the new products frequently right so this is their main strategy and then responsiveness and postponement this is what I was talking about postponement of the decision regarding the manufacturing will help us to you know pile up big inventories. So, when it is not there you are forecasting very accurately. So, that seasonal sale you need not to go for.

So, how they are doing this because they are spending huge in setting up the information network. So, that they can closely monitor their. customers and if you see delivery time within europe is 24 hours and they are promising 48 hours for stores in america and asia .so this is the strong promise promises from your zara some of questions are there we can just think of these questions what advantage does zara gain against the competition by having a very responsive supply chain because this is a kind of apparel industry is kind of trend industry right where new trends are coming every day new people want designs if i am bearing the shirt so same shirt someone else is wearing so we are in that way not happy right so that way will provide the competitive edge why has Inditex chosen to both in house as well as outsource manufacturing in house to control over the designing part coming up with the new designs frequently and outsource they have done that because Asian locations are cheaper so where they are very sure about the demand they are feeding those Asian players to produce those product another question is why does zara source products with uncertain demand from the local manufacture already i told about because uncertain demand local manufacture near to the market any fluctuation you can amend that but if you are far away still you are producing and you are not aware that customer is not demanding or may be their preferences have changed but still you are keep on producing so then you have to come up with the seasonal offers right then what advantage zara gain from replenishing its stores multiple times because they are not keeping high inventories so they have to make the frequent shipments replenishment cycles right so in that way they are more updated with the inventory right and do you think zara responsive replenishment infrastructure is better for online or offline that you can discuss but my personal opinion is if they are whatever way they are going because their network is so strong collecting the information but still if they are going with online. They can make more promises with the customers and in that way they can go for consolidation of the segregated orders as well because in offline way collecting all those orders and synchronizing will take little more effort and will consume because will consume time as well because many sources are involved in that way.

So, this is how you can see. different distribution network design right for the same industry same product they are manufacturing somewhere they are doing in house some products they are outsourcing right so this is the zara supply chain so these are the references you can go through so that's all for this session thank you very much