Logistics & Supply Chain Management

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Lecture 39 : Supply Chain Coordination

hello dear friends welcome back to NPTEL course on logistics and supply chain management today we'll start discussion on supply chain coordination so under supply chain coordination we'll see majorly we have three players one is supplier backward supply chain another one is manufacturer where we are converting the raw material into finished one and then we hand over that finished product to the distributor right that is the forward supply chain right So, we will talk about the coordination among all these three players, then we will see where we are lacking as we are talking about supply chain coordination and what will be the effect on the performance when we are not coordinating throughout our one system and we will talk about what are the obstacles we need to tap when we are talking about coordination in supply chain. some managerial actions how we can improve on that and then we will specifically we will talk about the bullwhip effect as one of very big obstacle to coordination we will end this session with the couple of cases so coordination in the supply chain so when talking about coordination that means coordination all the functional activities within one organization like distributor warehousing management agency manufacturing, co-manufacturer, supplier and within one functional unit one stakeholder what are functional units all the functional units marketing, production, quality, R&D, ISO what are different units HR department, purchase department so coordination among all is the first priority within one organization and then we are talking about coordination throughout the supply chain means all the stakeholders involved in that and those stakeholders are suppliers, manufacturers, distributors and retailers right so the goal of the coordination is to optimize the overall performance and how we can do that by improving efficiency reducing cost enhancing responsiveness and ensuring the timely delivery so very small example let us say if we are very sure about the demand function right we know how much demand is going to be there tomorrow right so to meet that demand obviously we will share this information electronically throughout the supply chain so when we are sharing the same data throughout the supply chain without any modification without the intervention of any individual stakeholder that means same information will go to the supplier same information will go to the manufacture to warehouse to inventory to transportation. So, that means in that case we can optimize the functions we can optimize the transportation function now because transportation function knows that this is the these many units we need to transport tomorrow. So, we need this much truck capacity.

whether we can consolidate order for some other player or some other demand we can meet through that journey or may be this demand is individually enough we can transport by utilizing the full capacity this is one example right so this involves collaboration information sharing and synchronization obviously information sharing like i told you electronically should be shared throughout the supply chain Talking about the key elements, so demand forecasting is first inventory management, production planning, transportation, logistics and communication system are some of the key elements where we need to focus when we are talking about the coordination in the supply chain. let's talk about the backward supply chain and coordination with the suppliers so first is demand forecast and planning collaborating forecasting that means if as a manufacturer or seller i am predicting demand i am managing the markets my representatives are there in the market they are giving me facts and figures so that this is how i am designing the fact my demand function I will collaborate on collaborative forecasting when I will share the same production schedule with my suppliers right so let's say if two suppliers or three suppliers are there So that means, if I need to manufacture 100 items depending upon the rating V 1 is the highest vendor rated right.

So, may be I will say ,I will seek may be 45 units from this vendor, then may be another ah 25 units from this vendor right, then may be another V 3 is moderately rated. So, rest of the 40 items I will seek from this vendor. I think rest of 30 items whatever so because the rating is V1 is highly rated then V3 then V2 right so this is collaborative forecasting this collaborative forecasting will happen only when there is real time sharing of information whatever sales trend market conditions as a manufacturer or service providers or product providers we are realizing we are sharing the same information without any modification with our suppliers inventory management now vendor managed inventory if we are talking about we are implementing vendor management inventory so that vendor is responsible for managing the inventory throughout the supply chain means up to the manufacturer so vendor may be managing the inventory in my manufacturing unit only right that also can happen or maybe they are maintaining inventory in the nearby storage house if whenever i need that as per just in time they will provide me the inventory so that also will happen when that close coordination is there when I am allowing my vendor that you can use my facility and keep the inventory there but I will pay you for that inventory when and as it is required and will be consumed through the production line so this is another example of coordination in the with the suppliers another is quality assurance now like we design the quality matrix right now this quality matrix all the criteria what we are evaluating we cannot keep those criteria with us only quality description sheet like in the previous session we discussed about that whatever if you are measuring screw length screw dryer or screw may be thread dryer so then you need to tell to your vendor that these are the parameters important for you know for that particular component and you need to maintain like these parameters within this

preference limit right so if you are sharing the quality standard whatever we have set up we need to share them so that We can minimize the need for returns and so that the no lots should be sent back to the vendor because of rejection. Continuous improvement, when we are recording all those parameters, we are know that may be one parameter the process is deviating.

we need to immediately inform our vendor that now we are deviating from the dimension and you need to take some improvement steps CAPA corrective action and preventive action how you can implement that so the next point here is communication and collaboration So, this will only happen sharing quality matrix, providing continuous feedback, minimizing the cost, allowing them to operate in your unit will only happen when you are communicating regularly in a transparent way. that means communication with suppliers and manufacturer you need to align how you will align your manufacturers your suppliers with your manufacturing strategy if you are implementing just in time you need to tell your supplier that this component we are looking for just in time so then only the person that supplier will maintain just in time system may be that supplier now need some training need some help from you some technology some how they can manage the inventory software right so then you need to conduct the regular meetings with them integrated IT system this is the platform where you can share that information right and you can track the information if you are sharing feedback how you are processing the order how you are tracking the inventory right what are your production planning right How you are designing the production plan for different models you are running in your production house. So, if you are sharing that on the internet that IT system information technology and same platform your vendors are attached. So, then your vendor will get the information without any deviation. now let's talk about the other end of the supply chain which is ending with the distributors so order fulfillment is the first function which our distributors are doing right how quickly you are responding to customer demand you are picking the order packing the order and distributing the order and the last mile delivery how timely efficiently you are ensuring that right so then you need to collaborate with your manufacturer with manufacturer that these many units are demanded these are the features demanded this is the customer service level demanded you need to replenish the inventory as you are distributing the product distribution planning so this will happen distribution routes you need to plan optimal routes and then schedule optimize the logistics and reduce the transportation cost.

So, if you can optimize that transportation matrix, so obviously, you can reduce the overall cost. Inventory management, stock replenishment as you are replenishing depleting the inventory right. Now, let us say very simple example, we are going to walmart we are going to vishal mega mart we are going to spencers one stop solution or

grocery store big grocery store so how it is happening there is one shelf they are maintaining all inventory on that shelf right so and this is one shelf right and this same inventory somewhere they are maintaining in the warehouse as well right so they are keeping all those products in the warehouse now there is this is one you can say the inventory the safety stock they are maintaining and some stock they are maintaining on the shelf for daily selling purpose right now if you are sharing this information how many units are on the shelf with the manufacturer with the suppliers how many units are in the ground this is transparent right so when you are moving the items on the shelf today you moved may be 500 items that information should be shared with all the stakeholders that 500 items are moved to the shelf right ready to be sold right so then let's say out of 500-400 customer today pick the product or maybe not today why today whole day we are compiling even single minute if any customer is going to that shelf picking the product then he is going to billing counter on that point of sales time when you are you know scanning the code and generating the invoices the billing information that point of time point of sale time how you can share that information completely that this movement 4 items are depleted from the shelf store so we maintained 500 inventory now we are left with 496 so as soon as you will deplete keep on depleting the inventory the information will be shared with the transportation network with the warehousing with the manufacturer with the co manufacturer with the distributor with the raw material suppliers right so in that way you will be better in planning in managing the inventory keeping the safety stock so that much item you need not to store customer service reliable delivery now you are interacting to customer through your distributor only your retailer is the main stakeholder who is directly you know interacting with that person who is ultimately going to consume your product and services so he is having the best information about the customer demand even if customer is rejecting your product picking some other competitor product why he is doing that he is having that knowledge how you can extract that information through your transmitted or that fast communication network right return management if any customer is manage you know asking for the returns how efficiently you are returning or exchanging the products that will also happen through your distribution network only and if you are providing return we have seen that e-commerce industry is almost 50 percent of the customers are you know before placing order they are visiting whether the returns are eligible or not right so then data sharing and analytics now regarding your how you will plan your production accordingly you will share that production schedule with your with your raw material supply so that distributor is going to you know provide you the insights about the customer demand and market trends any fluctuation in the market trend you can record through your distribution network right and then you can track that using the latest software you can analyze that and then you can make decision that So, for today you need to run only 3 models out of the 5 models you are providing in the selling in the market right because of whatever patterns you observed from the customer buying behavior right. So,

performance matrix. what are the key performance indicators in terms of delivery accuracy in terms of on time delivery in terms of on time return pick up in terms of correct billing information in terms of customer satisfaction attached with so many different types of services we discussed you are providing to the customer right collaboration and communication joint business planning with the distributor if you are promising efficient supply chain how you can go for that and then you can maintain the minimum inventory with the retailer so that you can be efficient but you don't want to be stock out right so real time communication advanced communication tool we can use like the example i quoted as soon as the customer is picking the product from the shelf and you are recording that through your sensors so it should be shared throughout your network right So, now coordination in the supply chain we talked about manufacturer versus supplier, manufacturer versus distributor, but suppliers versus distributor is also equally important.

So, let us talk about that, but before going to that we will see what are the interactions when we are going through the supply chain. See suppliers provide the raw material as per the purchase order raised by the supplier. your manufacturing unit, then our suppliers and distributor both are managing our inventory because suppliers are managing the inventory. of the raw material distributors are maintaining the inventory of our finished goods but it is not only solely their responsibility as the manufacturer when we are predicting the demand in the market we need to predict in that way having said that means we are predicting we need to plan the production accordingly how many models we need to run how many units each model required right Then finished goods are delivered from the manufacturer to the distributor warehouse, from where the warehouse may be a kind of order fulfillment center, right. from where you are picking packing the product and finally delivering the product to end mile delivery network right or may be through the retailers then you are selling the product and may be through your marketing advertisement whatever you are doing directly to the customer so then you are providing the product to the retailer so these all are interactions happening through the supply chain just a quick review.

suppliers and distributor coordination points purchase orders so when distributor clearly communicates their need to the supplier through purchase order that means i am talking about the point of sales information so through the distributor it is not only directly going to the manufacture but it should go to the raw material supplier as well production plan accordingly whatever you are placing order or you are going to place order to the manufacturer that order will be shared with the raw material supplier only so that bull whip effect should not be there that you placed order for 5 items then manufacturer planned for 15 items and then accordingly they placed order for raw material suppliers

for the 15 items if you need 5 items only so that should be production plan should be for 5 items and accordingly we should manage the inventory for producing the 5 items only So, delivery and transportation this should be then again attached because we need to ship only 5 items. So, then that transportation will be efficient when they know that during that container they can ship may be 15 items or 20 items, but still you are transporting only 5 items. So, how you can maybe you can consolidate orders from the other players or some other industries, so that you can properly utilize the capacity of the vehicle. lack of supply chain coordination and why it is there because there is no pure communication the collaboration among different entities one line that line of communication is not connecting through all so that means information which i was talking about that should be shared throughout the network is not that transparent and that will leading to inefficiencies and sub optimal outcomes one example is let us say again because we are saying bull whip effects the one example of bull whip effect only where here the retailer place the order for 10 items distributor again keeping in mind the safety stock placed order for 15 items then manufacturer started production for 25 items placed order to raw material supplier for 30 items So, this is means inefficiency demand is only for 10 items you are planning for 30 extra 20 that is inventory. So, inventory cost is not optimal in that way.

So, the bullwhip effect is caused by demand forecasting inaccuracies when you are not accurate with the forecasting techniques. or sometime what you do instead of what is there ,there is in manufacturer mind that if i will produce 10 again change over will be there for another model then again few items will produce then again will produce this one let us produce in one go 30 items right so that way the cost per unit item production cost we can decrease so that means you are trying to you know order batching consolidating so that that transportation sorry manufacturing cost can be minimized but you just imagine the inventory cost handling cost you are producing extra so you need to make you know trade off between whether you are ok to take inventory cost more or you are ok with the manufacturing cost price fluctuations are also there sometimes so that also cause bullwhip effect very quick example you might have seen if government is usually this happens because now there is market forces are deciding the crude oil price and then accordingly companies are you know changing the every day they are changing price petrol and diesel price but earlier what used to happen they used to announce that today midnight we are going to revise petrol price by five rupees up or down so if it is up you will see huge line will be there like they will store the petrol for whole of the life that is not happening but still we have seen that so anyway if they can save 500 rupees is enough for them right but if it is going to reduce no one will be there on the petrol pump because you know after midnight you will get cheaper price. So, this is also price fluctuation will also sometimes cause bull whip effect because for that midnight if it is going to drop may be for 12 hours 24 hours whenever you got the information prior. you

will not go to buy but it's not that there is no demand there is demand but because people are waiting for that period after that they will rush all and then there will be suddenly spike in the demand but actual demand is still saturated in any city the number of vehicles are still almost same right people driving cars or vehicles almost same right lack of information sharing is there right so then we discuss this negative impact of the bull whip increased cost excess inventory stock out right so we will discuss in detail how this overall if there is no coordination in the supply chain will affect our different cost right what are the obstacles to coordination in supply chain first is inventive obstacles because we don't want to you know innovate we don't want to go for new technology even if the new technology is for betterment still we will as a human being will show resistance to that right so that is very obvious human tendency information processing obstacles so correct information we are not sharing with our stakeholders somewhere because we are manipulating the processes we don't want that if we are charging one vendor is charging some other price other vendor is charging some other price we don't want that information to be transparent to every vendor because then everyone will try to you know inflate the prices then quality level how they are maintaining and once we are expecting different level of services maybe for one vendor we have different negotiation policy for other vendor we have different negotiation policy so then we don't want to share the information if those kind of things are there so then obviously that will be obstacle to information then another is may be you want to share the information the quick information coming from the customer throughout your supply chain but you don't have that strong in IT platform where you are sharing the information right operational obstacles production bottlenecks or capacity constraints suddenly you are getting the demand spike is there but you are not able to meet because of your limited capacity and then production bottlenecks because some processes in the production are taking more time let's say very simple example I will give you. This stage is taking 5 seconds, this is taking somewhere 6 seconds, this is taking 10 seconds, this is taking 7 seconds, again this stage is there taking 6 seconds like this.

So, if I will try to smoothen this production line, I can see this third stage is taking almost double than the first stage. This is going to be the bottleneck in the production. How it is going to be the bottleneck? Because this person will produce two, but it will be this person will be able to produce forward only one. that means after every one cycle there will be double inventory so there will be the pile in the end of this there semi finished good and may be we need to smoothen this production bottleneck we will assign two persons sitting on this stage those can process five second five second and we can smoothen on the production then next bottleneck will be seven seconds so how we can remove those bottlenecks so transportation delays, quality control problems if you are struggling with the quality your whole lot is may be somewhere stuck at the OQC and

you have produced those many units but your OQC department is saying outgoing quality control is saying that there is some problem with the lot you need to inspect the whole quality that means you just imagine 50,000 items are packed you are opening all the items because there is some serious concern right pricing obstacles i told you because different pricing policy with different vendors so then lack of transparency is there right and you you want to keep the power negotiation power with you only so then you don't want to disclose behavioral obstacle is one thing where i told you resistance to change human nature right and then lack of trust is also there because if we are operating in industry there are some players today maybe those are our suppliers you never know tomorrow they will be grow so big that they will acquire our manufacturing unit right so or maybe they will start expanding into that particular industry this happens many a time so bull whip effect this we have seen the information is this much only and over the stage how this is manipulated how this is you know inflated amplified right so The one very basic lesson from this is if you are going to include so many players, then every stage there is you know amplification of the information. so if you reduce only 1 to 2 so this information will be inflation will be reduced right so that means but then there are some industries where you need this long structure so what you will do you can only implement IT infrastructure your technology where you know quick information sharing will be there that any information is being recorded at any point either distributor end or raw material supplier end or wholesaler or retailer anywhere does not matter may be 20 players are involved in that supply chain even then same information you will throughout the network you will share transparently right so and how this is caused because of order batching price fluctuation lack of information sharing we are facing this bullwhip effect right and then bullwhip effect is there inefficiency increased cost excess inventory stock out poor customer service will be there we will see how it will impact our performance you can see Manufacturing cost will increase.

Now, one person may say, argue that how manufacturing cost will increase, we are manufacturing 10 units or we are manufacturing 100 units. Yes, when you are manufacturing in bulk, then the, because once you will standardize the process, you can minimize the total cost per unit, cost of production, but if you will quickly change over from one model to other model, then again there will be more cost right inventory cost there is no coordination all are keeping the inventory retailer is also maintaining distributor wholesaler carry forward agent all those players manufacturer is also maintaining the inventory then co manufacturers are maintaining raw material everywhere you are maintaining inventory and throughout this network you have deployed twenty storage houses warehouses where you are keeping inventory that all inventory is non-value adding activity wastage, so that cost. Replenishment lead time, because those many players are there, no kick information sharing, lead time will increase. So, transportation will increase, sometimes you are transporting 10 units,

sometimes 100 units, but you know the maximum unit you can transport 200. so that capacity you are not utilizing fully right shipping and receiving cost will increase level of product availability because there is no clear communication so sometimes you are you know storing extra inventory sometimes you are out of stock that will happen because there is no coordination and profitability obviously will decrease why because this cost overall cost will increase so your margins will decrease some managerial actions we can take to you know improve the overall performance we can define better pricing strategies we can stabilize the orders we can build those strategic partnership through the coordination so first is aligning goals and incentives aligning goals across the supply chain see this will be only possible when all the stakeholders can see the win-win situation if i am saying that we want to be responsive throughout our network that means we need to maintain the inventory through our retailer we need to maintain the variety we need to provide the quality we need to provide the highest level of services through our network and network means distributor retailer or online if we are selling so this responsiveness means throughout network we need to share variety that means variety components will be delivered by raw material suppliers variety means retailer will maintain the variety warehousing partner will maintain the variety manufacturing unit production unit will produce all the variety possible right so then you need to align but then when you are saying variety you are providing and maximum share as a manufacturer you are capturing so then why your retailer will be responsive because you are sharing risk with him but you are not sharing the incentives with him so that incentives overall whatever incentives are there level of services you are providing how much risk the person is taking or stakeholder is taking throughout that methodologically meticulously you should share the incentives also throughout that supply chain pricing for coordination so now Implementing pricing strategy like we should not use lot size based quantity discount, but we should may be two part tariff some fixed cost some variable cost may be if we are more volume may be incentives we can give right discounts we can give if they are coming with more quantity right then contracts such as buyback revenue sharing and quantity flexibility can also optimize the product availability and supply chain profits right alerting sales force incentive so there is one approach sell-in if you are selling to your retailer that is not the ultimate objective you should sell through your end product to the end user selling to retailer means your retailer is you only you one supply chain right so if you are producing selling to retailer but retailer is not able to sell further then it is a problem then improving information visibility and accuracy this is what i was talking about point of sales data so as soon as you are scanning that product code quickly that information should be shared this is what point of sale data is implementing collaborating forecasting and planning where your all stakeholders are there and if i am forecasting the demand all the stakeholders should be there and they should also see if i am looking for demand function how accordingly transportation agency needs to behave, how accordingly warehousing needs to design

their function, how accordingly raw materials provider should plan their productions, designing single stage control of replenishment, it should not be that retailer is placing order with the wholesaler, wholesaler is placing order with the distributor, distributor is placing with the manufacturer, manufacturer with co-manufacturer, co-manufacturer with the raw material supplier, that should not happen one replenishment order should be shared throughout the supply chain without any intervention in that right so we have some softwares for that vendor managed inventory and warehouse management inventory so that we can use for better decision making improving the overall performance operational performance so first is if you can reduce the lead time you are sure about the information this much order is required you can process that order and then you can you know reduce the lead time the delivery time you are required to deliver the product to the end customer reducing lot size so smaller lot size reduce fluctuation between supply chain stages but then smaller lot size problem is with manufacturing cost that will increase but then the inventory cost will decrease right So, decreasing information distortion that will help you if you are producing in small lot size right.

Operational improvement that lower fixed ordering transportation and receiving cost can facilitate this reduction in cost right. Rationing. so based on your past data like i talked about that if there is sudden spike in the demand because they heard this news that today midnight petrol price is going to increase so then everyone will go to your you know petrol pump and they will start refilling to the full capacity they have they will fill all the cans whatever they are having right but how you can stabilize the demand during that by implementing rationing schemes right so that that is artificial inflation because if today they are coming for with that all demand if they are coming maybe after two days then maybe up for next 10 days they will not come so what you will do during those 10 days so you need to stabilize that demand and next is designing pricing strategy to stabilize the orders so again the best strategy which is opted by Walmart is everyday low pricing so we have seen that during the seasonal offers or maybe the festival season offers the demand through your placing orders through Amazon flipkart increases by 60 percent that means you are not stabilizing the demand if you are not stabilizing the demand during that time you need to produce more that means you will acquire extra resources machines manpower extra facility but then because season is gone for maybe that season is only for one month or two months then after that what you will do with the extra resources so the other strategy is how you can stabilize the demand uniformly so that accordingly you can manage the capacity and that capacity can be properly you can efficiently use that full capacity building strategic partnership and trust so trust and information sharing are two parameters which are important only then your coordination will be there right so if you are sharing the full information with the stakeholders you will get their trust as well right so and in that way you need not to duplicate the efforts right if you are sharing partial information with them or what if any conflict arises between that

can be there right conflict can stakeholders are going with you all the time there can be conflicts related to delivery related to quality related to pricing all that but how you are negotiating how you are settling the disputes so whether you came across some common mechanism where you are implementing that and you are resolving all your conflicts how efficiently you are doing that and this already we have discussed the supply chain macro processes where we talked about in one session the customer relationship management forward supply chain where we are talking about how we are selling the things products to the customers or services how we are negotiating how we are dealing with their after sales services order management whatever queries customers are having we are handling through customer relationship management internal supply chain within that internal manufacturing unit how we are planning the production how we are scheduling our activities how we are sequencing our activities how we are utilizing the capacity demand we are planning supply we are planning supplier relationship management all activities focusing on the relationship between supplier and So, we are negotiating with them on quality, cost, price, variety, changeovers, different models, right, any disputes, delivery, all those things, we are sharing the design specifications, all those things will happen with the supplier relationship management. so here is case study of amazon and we will see quickly how amazon has leveraged on this strong their strong IT infrastructure and developing very strong customer relationship management and then this amazon's CRM success is its ability to you know customize product offering to the individual customers so whatever your you know tailored kind of supply chain so where they are as per your requirement they are providing you the products now you can also feed your requirements in the if any product specification so accordingly they will provide you the products right so very strong with maintaining their customer relationship management this is particularly one click ordering system where under industry 4.0 now amazon is implementing see if I am repetitively there are so many products we are buying right and very routine products are also there if I am taking sugar or tea So, tea is whatever I am buying, I am buying the fixed brand and in fixed size.

So, whenever I need to place order for tea, why I need to search all the brands, pick that brand, what is the size, what is the price. So, there should be one push button, I am pressing that immediately everything is done, the order is placed, the payment is also done automatically. because that is very fixed brand and the amazon should know that i am buying this sugar brand this tea brand this size or any flavor or any product right in this much quantity i am pushing that button so they are providing you that this is under industry 4.0 where you will just push the buttons and you will place the repetitive order so that information accurately is shared because routine orders in that way amazon can be efficient right and if any customized products are there then you can provide your information and then they can provide that customized products as well so you see with this customer relationship how efficiently they are managing i need not to work those

routine items what extra you will do right you cannot do anything else so this is one example so see there are rarest instances when customer need to call the center right so even if they need to call the center amazon should provide them the best positive experience that means because they are always facing problem so many customers are calling sometimes may be wrong billing information wrong product delivered in wrong may be return is not picked so many problems can be there so then if it is there how they are enhancing your experience if they are experiencing heavy traffic on their call centers they are just asking you that you can just push the call back button send the message we will call you back as per your availability you just mention the time we will call you back right So, there are so many softwares SAP, ERP, Oracle, Salesforce, Microsoft they are managing all the products, but the beauty of Amazon's back end team IT team they are developing all these innovative platforms within house right. So, that is providing them the competitive edge.

Another example is Hindustan Oil Limited which is again. financially they are doing very well providing different products and then also customer centric approach where they are focusing on quality they are focusing on delivery research and development the latest lubricants oil whatever products they are providing to you right so you can see their success can be attributed to strategic approach that is based on customer satisfaction commitment to quality and sustainability investment in the research and development and that is happening through their efficient supply chain management that ensures the timely delivery the variety the quality and to the large customer base right so they provide diverse range of products and services including refining marketing distribution of petroleum products right and the revenue is is also growing significantly right. So, this is and then they are ensuring the sustainability measures also where they are promoting you know how they can reduce the carbon footprint, how they can you know deal with those because petroleum products are you know usually when we are using that those products the high carbon footprint is there, but still they are coming with the counter measure how and where they can reduce that right. So, we can conclude now this coordination among all the stakeholders, manufacturers, their forward supply chain with the distributor, reverse supply chain with the stakeholders, how they can collaborate, connect in such a way that any point of time they are getting any information that should be shared throughout so that they can maintain that strong and healthy relationship built on trust transparency and shared goals so incentives are also shared in that way if my objective is also optimized your objective is also optimized in that way we'll all together work for that so in that way collaborating planning forecasting and replanishment will help you you know to throughout the supply chain to manage the efficiency and effectiveness so this is all about supply chain coordination these are some of the references so thank you very much