Logistics & Supply Chain Management

Professor Vikas Thakur

Department of Humanities & Social Sciences

Indian Institute of Technology, Kharagpur

Lecture 13 : Reverse Logistics (Contd...)

hello dear friends. Welcome back to NPTEL online course on Logistics and Supply Chain Management. I'm Dr. Vikas Thakur, Assistant Professor, Department of Humanities and Social Sciences, IIT, Kharagpur. So, in the last session, we started discussion on reverse logistics and we talked about what are the key aspects of reverse logistics, why it is required, and what are the factors which are forcing to implement this reverse logistics network. So, we will continue discussion in this session as well and this part already we have covered. So, in this session we will try to see what are the key aspects in reverse logistics, the steps process involved in reverse logistics.

what are the factors if you want to be successful in your reverse logistics network and we will see some of the KPIs, performance indicators and how we can manage those performance indicators and then we will end up this discussion on reverse logistics by discussing some cases. So some key aspects, product returns, right? Already we talked about that product can return either because of defects, damages, overstock. If your retail partner is overstocking the product, even then it can come back to you. Simply customer is dissatisfied with the product even then it will come back to you. Now it is your distribution network, how you will receive it, you will inspect it.

If it is kind of unused product, then you need to inspect that whether new packaging is required. I told you that cleaning is required, ironing is required depending upon the product nature. if it is not so if it is used product under warranty it has come back to you then you need to inspect how much value is left in that product and if it is at the end of life then again you need to identify what are those components in that complete product which you can refurbish or reuse or recycle those components and then you will come out may be around 15 to 20 percent part which you cannot use anywhere may be then you will go for disposal if that is the ultimate option you have. So, then if you are incinerating the waste right. So, how that energy generated after incineration how you can use that energy to convert that energy into electricity or some other form.

So, this is something that very basic fundamental concept of the nature is that energy cannot be destroyed cannot be created. So, that means, why you are wasting then that

energy. So, how you can use one form of energy to another form is a kind of example. Then, the other aspect is remanufacturing, refurbishment. You will take out some parts, using those parts into some other product or again maybe you can repair, clean them, reassemble them.

So, these are the processes under your remanufacturing or refurbishment. so then recycling and disposal so recycling packaging material again you will shred that packaging material again you will come back with the new packaging material let's say if it is plastic component again you can melt that plastic convert into plastic grain and then can be used that grain can be used to you know to give that plastic in a new shape. So, that new shape can be come into just a on off switch or can be used as a casing of your your mobile phone, casing of your these remote controls. your electrical components where you are using those plastic material right so this is how you can recycle that disposal final disposal i told you how if hazardous items are there and you need to dispose of those items so that should be done carefully because there are guidelines for how you can handle those hazardous items right if this if those are infectious kind of waste So, you need to go for disinfection kind of process. Then warranty and service management, if you are handling the warranty, you need to repair, you need to replace the components and what you will do with those replaced components, used components or which are destroyed right.

So, that also you need to manage. So, this is under warranty, if it is coming already we discussed about this. asset recovery and remarketing i told you how much we can recover the value out of that may be the shoe material cannot be used again making another shoe but it can be used somewhere else if it is not possible can we collect all these points plastic or these kind of material and we can use for road metalling purpose can we go for a kind of may be if it is compostable. So, can be used as compost we can use for may be those material whatever we the kitchen waste is coming we can use as may be fertilizer. So, this is how the asset you can recover out of the waste is right.

So, and again it should be ready for sale should be ready for remarketing not in the same market. So, may be then in the secondary market as I discussed. So, then we can go for that supply chain optimization like we are try to optimize the forward flow of your supply chain activity same way we can optimize this the reverse flow also. we should have the proper information that traceability should be there, where we are producing the product, what kind of waste we are generating, how much value is left in that product. So, we have softwares quickly can analyze that this much value is left over in that particular waste and we can use that.

So, that also we can ensure the efficiency in collection center we can ensure the efficiency consolidation of the raw this waste. We can do that because if only 20 percent items are coming back how you will ensure economies of scale when you are i told you you are selling 100 items only 20 items are coming back so then can you combine collaborate with some other partner and then utilize the full capacity of the container you are utilizing to you know transport back to the seller right so these kind of things optimization in warehouse also you can optimize how much inventory you are keeping that inventory how quickly you are rotating the stock again to the market after collecting that product from the customer. So, these all things should be there when you are talking about supply chain optimization. So, we will see one video how this. end of life how we can deal with the product there is one small video video link you can just go through this video and you can relate the concept more closely with this right so dear students i am again i am assuming that that whenever i am referring these video links you are going through because sometimes i am including examples from there so you can refer these videos ok so just you go through this link and we will continue the discussion right so how can build this house of reverse logistics first thing is this reason for this reverse logistics should be very clear why you are doing this and why your industry need that reverse logistics right so ah either it is pressure from the regulatory authority or your social responsibility under or may be corporate you are building your image in that way environmental concern or may be sometimes the customer awareness.

So, if you will go through this steps these steps. So, first is your reverse logistics input. this is the used part material you are collecting right from the customer from the customers and then you need to forecast properly so that you can design your distribution network capacity consolidation centers capacity in that way so that you can cater the needs of the customer right from where the returns are coming then process if you talk about So, maybe disassembly is one of the very important concept where you need to disassemble the products and then you need to find out the products which are having certain value left in those components and again you can reuse those things. Inventory management, supply chain, repair, refurbishment, manufacturing, recycling then all these things will be there, processes activities will be there as part of reverse logistics process. reverse logistics structure if you talk about.

so you need to develop again the complete structure reverse supply chain where you will set up your location and then inspection consolidation center you need to integrate your manufacturing units as well who will be recovering the value of those products and then again assembling the products in the final one right so again we will ensure the re-manufacturing of those products so this is the reverse logistics structure reverse logistics

output So, you need to price those after remanufacturing again and you need to set up the relationship with the customer that is the reverse logistics output. Now, the thing here is when you are completing this complete system. as a customer if i will say that whatever you are using is of made up of may be recyclable material that depends upon the product if it is kind of packaging may be you will feel happy ok this packaging is again recyclable and then i am not depleting the environment so ok i will welcome this step that they are because packaging anyhow is carrying the product from one end to other end after that once it is done there is of no use right so then how if they are 100 percent they are recycling that so this is kind of initiative we will welcome as customer but if I will say this shirt you are buying is of recycled material right so then you will be may be little hesitant in that way if I am paying for new shirt why I should wear the old one right old stuff but then you need to understand the technicality of this how this is happening how they are recycling it how they are making it a new fabric right it's not like that but still there is this perception is there in the mind of the customer that this is used product or this is repaired product this is remanufactured product right so this these things are there which are challenging right as marketing team you need to overcome these challenges and somewhere sometimes what we are doing we are selling those products may be at lower cost in the secondary market And we are saying that the fresh products which are coming directly from the if you are using directly your if you are talking about steel it is coming from the ore. So, then you will say directly it is coming from there it is fresh steel. So, you are not compromising with the quality right.

So, these are the reverse logistics steps first you will get the return of the goods at the gate keeping it will be checked and then collection will be done after that sorting will happen into different categories then after that treatment will happen may be in terms of remanufacturability, may be in terms of recycling, may be in terms of reuse, may be in terms of repair. and if not all those things are possible then may be you will finally go for disposal that you cannot recover the value and then you will go for disposal. So, you will throw that material in the disposal system. So, we will go through quickly these steps see gate keeping how this is happening. so your customer will communicate with the company if return is authorized so that means you need to compensate right first you need to ask whether you need to authorize that or not if no then you can directly compensate if yes then you will do the verification you will check the product whether customer has not damaged it packaging is there or seal is not broken kind of things you have different checks depending upon the product right so then if it again it is no you will send back that to the customer you will not accept the return if it is yes return is accepted so obviously that now you identified that the fault was the courier partner or may be the manufacturer or whosoever but it is your fault your supply chain fault right so then you will go for compensation and under either you will give the customer new product or you will return the money.

So, in that way you will be sharing the information whether you are returning the money or you are giving the new product. In the end you will collect the old one which is destroyed. So, after collecting the next stage is collection. So, now you will collect. how you will collect whose responsibility either company will collect directly or third party will collect or it is the responsibility of the customer sometimes after the end use of the product some companies are contacting with the customers that if you will deposit that back to the company you will get these this coupon you will get this much off in the next purchase right so this is again very good idea if let us say we talked about 20 to 25 percent minimum the returns are coming from amazon we are selling from ebay we are selling from flipkart we are sitting right so let us say we will develop one strategy i will ask my customer if because the product return is 25 percent if I will say any product any customer is maintaining the return rate less than 5 percent so that means I will give that customer may be free delivery for maybe next ten deliveries or maybe free delivery for one year or maybe six months right depending upon calculating the cost benefit analysis and all that but even then if you see 20 to 25 percent items are coming back that is also cost to the company so if we can reduce that in that way we can avoid that wastage as well we can maintain the good relationship with the sellers also because if seller is selling the product after 10 days he is getting back so then that is also you know kind of business relationship will be hampered so how they can come with that policy because if you take amazon prime membership that will also cost you around somewhere 1500 per year right so let us give them free prime membership so if they are not returning more than 2 percent give them free prime membership so that means now 22 to 23 percent you have reduced the returns so this is one policy which can be considered for this and depending upon who is collecting either company is collecting third party is collecting then you will ship that product and again you will be checking the product right So, then exchange will be done if the product is damaged and it is not the responsibility of the customer and then you will transport that the defected product to the nearest service point or may be consolidation center where the sorting will happen.

So, next step is sorting. so this is one small case study which i was talking about canon has done this beautifully what they are doing just to collect the cartridge after usage they are giving the prepaid shipping coupons to their customers now customer need not to spend on that and they are also feeling encouraged that if i am getting the free coupons and courier partner is not going to charge anything let us take this responsibility at least and will give the cartridge after use will return back or maybe if they want more loyal customer they can say on the next cartridge if you will purchase from Canon will be given 5% off or 10% off in that way you will maintain the healthy relationship and you will ensure that customer will again and again and again will buy your product right and this they have done in 24 countries right. So, for complete case you can go through this source right and search how

they have done this right. So, either they are doing this by their logistic partners courier services or they are their customers are directly shipping the after using the cartridge they are directly shipping to Canon right. then the next step is sorting after getting the returns you need to sort all those returns on different conveyor belts right so like i have shown you one video where watch was also there in that you know big packet there was t shirts undergarments so many things toys were there appliances were there right small appliances were there books were there you are getting this segregated kind of products from everywhere from every customer grocery items are also sometimes returned right so that policy if allows so you will receive that return verify again if you are accepting that that means you will return you will compensate the customer in terms of either you will return the money or you will replace the product if that is done after that you will do the sorting consolidate that product and transfer to the treatment center now clothes collected will be sent to the clothing treatment center groceries again will be stacked in your grocery warehouse books will be stored in your books bear house right any cold storage items are there usually we are on perishable item cold storage items there is no return policy right usually we do not find return policy ok so this is the step of sorting then processing now this is done in three stages they choose from a list of processing activities what kind of processing you can do how that is defined depending upon the you know what is the age of that product you collected what is the condition characteristics nature and then If you are doing everything, remanufacturing, refurbishing and then coming up with the new packaging even then you are not able to sell in the same market.

So, then it is a kind of economic burden on your company. So, those three dimensions of sustainability you need to somewhere handle. And in the end treatment will be in terms of either you will repack that, repair that, disassemble that, again assemble that, reconfiguring, then again remanufacturing, updating, upgrading or recycling. And this is another very good concept is donating. If the value is there and you feel that this can be of any use for any other thing, so that can be donated.

secondary markets are there as I told you instead of you know half used item directly you know disposing them still very good option is can be you know use those items in the secondary markets with the lower price or may be we can add some value in that and then we can sell those items at a reduced cost. finally, is the disposal system right. If presence of hazardous material I told you, you need to treat it as chemical dis-inspection process or may be different treatment options are there. Either this is very common where incineration is done, where we used to treat at 1000 degree Celsius or may be sometimes more than 1200 degree Celsius, we treat the waste we burn the waste actually at very high temperature and when we are burning that smoke is coming out of that right then ash is also coming if it is hazardous this ash will be hazardous right how we are dealing with that

ash right so sometimes that ash can be used as fertilizer as well or if it is not then you have to go for deep burial right so that is also land filling kind of thing you need to do. So, if smoke is coming you need to pass that smoke through the water.

So, that those harmful elements should not go in the air this kind of you know in disposal you need to take care. Why I am highlighting these points because this all when you will ensure all these things this will carry cost. So, why we are going for incineration other option is microwaving other option is autoclaving why we are going for these all options are for treating your waste. either you go for incineration microbebing or autoclaving so there you are disposing of your waste so this carries certain cost why don't we reduce the disposal system there should be minimum requirement for disposing of the item and we should be able to recover the this and when we are we have decided that there is no alternate we can use that heat energy coming out of that like now you might have seen very beautiful concept hybrid engines are coming In Maruti also if you see Grand Vitara is coming with hybrid engine they are promising the fuel mileage somewhere around 30 kilometers per liter. Can you imagine from 15 kilometers they are promising 25, 30, 35 kilometers per liter.

the how they are doing this because this is now hybrid engine you will run on fuel also petrol or diesel and then battery operator and these batteries are not charged by any charging station so that limitation is also gone that you need charging stations for electrical vehicles so now what is happening when the vehicle is running on fuel petrol or diesel the wheels are moving those that kinetic energy they are converting into electrical energy which is used to charge the battery and when you are maintaining that speed of may be less than 60 kilometers per hour you can use that electricity that electrical energy to run your vehicle so this is how the efficiency has increased right. So, we will see just factors for successful reverse logistics these are some of the factors we will quickly go through visibility transparency already I talked about you need to track the products and need to understand the condition how much value you can recover out of that right and in that you need to identify the bottlenecks delays or areas of improvement may be sometimes it is lacking we are lacking with the proper collaboration with the customer where we are not able to collect the product after use so we need to tap all the stakeholders in that process and then efficient return management we need to ensure streamlining all the workflow right and we should be clear with the return policies as well ok so once it is returned how you can again quickly place that order for on your shelf selling shelf and it is available for the next customer so that will show how efficiently you are doing it product recovery and disposition maximum recovery should be there in terms of either you are completely recycling the whole product or you are using some components of that product right that in that way it should be maximized and disposal should be minimum to the end like

incineration kind of thing and if you are going for disposal how we can use that disposal process also for generating the energy and storing it for some other purpose so to ensure efficient reverse logistics tracking feasibility so collaboration with all the partners, suppliers, manufacturers, retailers and service providers should be there if you are promoting yourself as green manufacturer and your customer are visiting your retail shop and your retail person is saying that ok I will not accept this where I will keep this damaged product I don't have that much space that means your strategic alliance is not good with that retailer right so why retailer should do that you should give enough reasons to retailer to you know so that means you need to maintain the collaboration that industry relationship with your complete stakeholders all the stakeholders should be there only then the smoother coordination and execution of these reverse logistics activities will happen network design is also important flow of return products material and information so inform we talked about the flow of product right the information is equally important like we have now some types of software which can analyze the end product value and life left in that some of the components quickly we can analyze and we can share the information with the supply chain partner that out of this product these many components we can recycle and in that way we can minimize the lead time and the processing time for collection time as well right it should not be for longer period of time with the customer how quickly you can efficiently you can pick the product right and then technology integration should be there data analytics when you are tracking the system so obviously you can predict what is going to be the demand for return, what is going to be the demand for end of life product management, and then in the warehouse, how you can sort through automated warehouse, we talked about robot controlled warehouse, right, and then predictive analytics tools can be used to maintain the inventory of these recycled product within your manufacturing hub or warehouse. then complies with the regulatory requirement obviously when you will address these points so regulatory authorities will also appreciate these points because now you are taking care of the product you are producing at the end of life or byproduct you are producing or packaging you are you know by as byproduct you are producing in the end so that way you will be complying all the regulatory authority or may be the environmental or legal formalities whatever there customer experience and satisfaction so as a customer if I am everyday I am going to dust bin throwing that package or may be some person is specially hired person is coming to my doorstep and then taking the garbage everyday and instead of doing that and throwing that in just dust bin if the courier partner is coming and collecting all the packages and they are delivering the product at the same time they can collect the product as a packaging as well right so that will you know enhance my involvement with you as you know as brand and then i will be feeling more part of that supply chain i will feel comfortable i will feel more delighted because now my brand who is providing product or services to me is taking care of the environment continuous improvement and innovation when we will track the performance matrixes and then we will track the feedback from the stakeholders from the customers so that will happen only

when you have deployed the technology transparent technology for tracking those indicators performance indicators so obviously you can continuously you can improve on those parts sustainability and corporate responsibility that is main when you are getting so many resources from the environment you are depleting the environment so just you cannot say that this is required as a part of process this is required you should take some responsibility of the byproducts you are producing right it's not only byproduct of that product you are using in the market but sometimes while producing that product also you are producing the waste right by products how you are taking care of that how you are taking care of the carbon emissions coming out of your industry right so that also you need to take care so a performance measures in reverse logistics these are some of the performance measures quickly will go through return rates how many returns are coming high return rates means your products are not meeting the customer expectations low return rates means you are meeting the customer expectations right return processing time how quickly you are processing the return and shorter processing time means customer is raising the request related to returning the product or repair or under guarantee and immediately you are repairing the products right. So, that will ensure return processing time, recovery rate, how quickly you are recovering the value from the product and maximizing the value recovery right and minimizing the waste. That means minimum should come for the disposal and this I told you that myth is that refurbished hardware was once defective that is our mind set we need to change right.

regulatory compliance how many times we are complying with the environmental regulatory norms rules right so that also will so carbon emission what is the carbon footprint so that we can calculate and we can compare whether we are within the line of regulatory compliance or not Disposition cost, like I told you, when you are recovering the value from the end product, that means again you are using, you are not disposing. But when you are disposing, again you will go for verning that disposed product you are incinerating that product waste so that means that will carry certain cost you are transporting to that disposal center you are storing there then people are handling that burning that again after burning ash management all those things are there and then you are polluting the environment as well So, this is the cost direct and indirect cost. Transportation cost in reverse logistics when you are carrying the product from the end customer to may be to fulfillment center or warehouse centers to manufacture for again remanufacturing that product or sometimes you are shipping some components to the vendors from where those component originally were coming right. So, that will carry some transportation cost. inventory holding cost if you are maintaining so much inventory of these inefficient products then also it will be you know cost to you so either you should sell it quickly in the market again or you should reuse at some of the components or you should give those components to some other industry as raw material like i told you the case of steel used in cars steel used in aeroplanes or other those precious items and then we

can use those steel again that steel we can use for manufacturing steel rods or steel sheets right.

again because reverse logistics the very first and basic stakeholder is your customer if your customer is not educated throwing your garbage anywhere on the road on the street that is quite often this is happening that you will see garbage all around the dust bin but not in the dust bin right so other side outside of dust bin it is full but within dust bin you see so then how efficiently we are replacing the dust bin that is also very important point right but then yes this thing will start from the customer only we need to educate or we need to motivate the customer like you can give some promotional offers if you will return the packaging the next delivery will be free kind of things and then will customer will feel happy that i am doing nothing but then i am getting the free delivery just because of and i am playing very important part in that sustainability. So, environment impact you need to take care of carbon emission, energy consumption and how much waste you are generating. Continuous improvement will be there when you will be tracking your performance matrix and you need to come with the innovative technology of packaging and I will tell you how this MYNTRA has done that and this will be done only when your supplier collaboration is there. because some of the components may be directly will be supplied back to the suppliers and then again can be used as the raw material. You need to train your manpower as well.

if you are using data analytics for predicting the demand then your manpower should be you know equipped with those tools they should know how they can handle this for forecasting if you are doing the reverse logistics your courier partner should know about how you can handle the waste in more efficient way reducing the you know that capacity required to transport that waste again back to the manufacturer. Then technology adoption may be software tracking for how much value is left in that product and these are some of the parts. Packaging tools we are using RFIDs, IOTs, AI driven approach where we can be more accurate in finding out how much material is coming from which end and we can you know optimize the roots of the vehicles as well to collect that garbage and then the risk management contingency plans right risk management product recalls i have given you one example how products are being recalled when manufacturer suddenly realize that something has gone wrong and from maruti suzuki from volkswagen from bmw all those example i have given you earlier reverse supply chain integration among all the suppliers coordination efficiency and resource utilization this is complete system my retailer cannot say that I am not part of that my courier partner who is directly responsible for collecting the waste from the customer waste packaging cannot say that I am not involved in that I cannot be part of that I don't think I can do that right circular economy initiatives so many organization are moving towards that if you are the concept very basic concept if anything

enters into your circle of production consumption taking back it should not leave the circle right so there should should not be any concept of disposal of your waste. So, whatever you are using again you should reuse in your industry as a raw material or you should provide that raw material to some other industry. Already we talked about the alignment, strategic priority should be there with your all the stakeholders.

So, retailer, distribution, warehousing agents, manufacturer raw material suppliers all should be collaborated and this will happen and you can ensure the stakeholder engagement in that and you can earn more trust and you can be accountable also for who is accountable for collecting the waste who is accountable for recovering the value from the product right so who is accountable for remanufacturing so that also you can share so this is what I was talking about the case study of Amazon so they have ensured no first return policies and many innovative program policies they have to ensure you know returns but because they are promising cost-free returns just to build the trust between the customers and manufacturers and just to ensure that more traffic should come to their website so the only basic reason is that Although, they are attracting more customers, but the volume of return product is also increasing. So, already we talked about e-logistics industry or e-commerce industry where many products are coming back and you can just see a record of 761 billion dollars merchandise was returned to retailers in 2021 and this is increasing year over year you can just compare the figures. 15-20% increase in every year so how to manage that but amazon has taken this challenge and now they have avoided more than 2 million tons of packaging material since 2015 by going green packaging they have reduced 41% per shipment packaging weight right and then they avoided 37150 metric tons of plastic globally So, this is how they have done that product donation is one thing they are through software they are identifying how much value is left of in that product and then they are giving those products donation. They are collaborating with the local community organizations and through those community organization they are just donating those products to the needy people.

who cannot purchase the new one. So, they are giving those products to new one. This is one example you can see how many packaging components are used for this standard and after they reduced this is they reduced 14 packaging components. volume in terms of volume they reduce 69 percent and air shift if you are reducing 69 percent volume that much cost will also be reduced but what is the major thing see when primary packaging is there they are putting again secondary packaging this is secondary packaging here only primary packaging is there so this is SIP your you are shipping only in your product packaging you need not to label your packaging on that. So, this is one big and then if you are putting separate packaging for all the component 15 components you are carrying inside that box again will reduce the will increase the packaging size weight and then packaging material.

So, that is one thing you need to handle. Another case study is on IKEA which is well known for furniture. So, how they are taking the responsibility of their end products? They try to minimize the waste, maximize resource recovery and reduce its carbon footprint. So, they collaborated with their stakeholders and customers and they encouraged their customers to go for returns, refurbishment and recycling. So, under their initiatives so they product returns management they said that if within a specific time they are getting the product. So, full refund will be given so that means, they will be recovering the full value of that product even if after use they are extending services to their customers.

So, that they will inspect it repair it and again will be available for the customer for the next life cycle. so and if it is kind of you need to dispose of so material recovery may be you are recovering the wood metal plastic or other material components you have used in that so ikea is doing that they are collaborating with their customers to you know collect those materials back so that again that can be use so in that way durability repairability and recyclability concepts are ensured through that and they have reduced the amount of waste that was directly going to landfills because landfill cost is also increasing day by day right so that is also very important disposal cost is also increasing day by day so how you can recover those components and again utilize that but to ensure that ikea has to develop a very efficient transportation network collection network. So, that they can collect every end used product and then can be again used or may be the components the ok components can be extracted. So, we can see that how they can be committed to sustainability and environmentally they are responsible just by handling their end products. this is we have seen that how reverse logistics is ah these days very crucial because first is your very important stakeholder customers are now getting more awareness about that and your regulatory authority governments are forcing you to be more sustainable your packaging should be sustainable so in that way you have to develop a parallel distribution channel which will collect from the end customer and you will again ship those products end of life product or warranty products or may be your semi used products unused products again to your manufacturing facilities there again you will sort those products will again use some of the components again you will sell those products not in the same market than may be in the secondary market with reduced cost.

So, this is all about for reverse logistics. In the next class, we will discuss about the green logistics and then we will talk about lean logistics. So, these all concepts will lead to towards the ultimate sustainability measures. So, these are the references. So, you can refer these books.

So, that is all from my side. Thank you very much.