

Logistics & Supply Chain Management

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Lecture 58 : Sustainable Supply Chain

Hello dear friends, welcome back to NPTEL online course on logistics and supply chain management. So, today we will start our session on sustainable supply chain and which is again very important aspect of any supply chain because the increasing awareness of the customer and then obviously the pressure from the regulatory authorities, the environmental agencies. So, these all forces are there. so which are forcing us to you know go for sustainable kind of supply chain so in this session we will discuss about the role of sustainability in the supply chain and we will discuss the triple bottom line right of sustainability how we can implement that through our supply chain what are the benefits key matrix of sustainability then we will talk about how we can ensure the sustainable supply chain through implementing our main drivers of supply chain and then we'll talk about some of the challenges we'll end this discussion with one case study so supply chain sustainability obviously here the basic focus is how we can ensure the environmental and human aspect right and the impact can be minimized whenever we are you know doing our supply chain management activities whether we are talking about extracting the raw material, transporting that raw material to the production manufacturing, then from production manufacturing, warehousing, distribution, reaching to end customer, whatever means we are using, how we can deliver that product or services so that the total environmental or social impact can be minimized and then we will talk about the economic parameter as well which is the third pillar of this sustainability right so the goal is to minimize the environmental harm and the factors like energy usage is very important how you can minimize the consumption water consumption how you can ensure the minimum by product you are producing while you are delivering the product and services so obviously first we were discussing about how we can be you know more profitable we can generate more revenue tapping customers through supply chain activities but yes now the third angle we have to be sustainable as well so here i have included one link of nike right how they are ensuring the sustainability facility and supply chain when they are reaching to end customer and they are promising that their shoes are leaving the minimum footprint on the planet right so in that way they are saying that hundred percent recyclable energy they are using they are using solar lights they are using turbine lights so energy to you know to operate their facilities right so and then packaging also they are ensuring that 100 percent recyclable packaging how they can ensure and then after the use end life of the product again how

that can be recycled so this is the video you can just go through talking about the role of sustainability in supply chain So, the very basic thing, obviously, like I mentioned, 21st century, we are now more concerned about sustainability because we have degraded or depleted the environment up to that level. Now, we are falling short of our resources. Continuously, we are extracting the resources from the environment.

Now, we need to, you know, support the environment in that way so that these resources can be made available for the next generation also. right so the health and survival of every supply chain and every individual depend on the health of the surrounding world which is obvious right from where we are getting these resources and if we'll talk about one led commission of united nations they define that the development that meet the need of the present without compromising the ability of the future generation to meet their own needs right how we can ensure that development And then United Nations introduced a framework identifying three major parameters, economic, environmental and social sustainability. It's not only we are taking care of the environment, then we should forget about the economic parameter or we are taking care of the society, we should not think about the economic. Economic sustainability is equally important and maybe the more important because if we are surviving economically, only then we can think of other parameters, right? obviously how in the past recent decade large countries like brazil china india these countries are growing and obviously when we are saying the pace of growth is so high that depends upon how you know frequently quickly they are extracting resources from the environment right so obviously when we are continuously extracting the resources from the environment so how long we will be able to do that.

this space or growth whatever development we are talking about may be our environment our natural resources cannot maintain for longer period of time so then comes the basic factors we need to discuss under answer this sustainability is first how we can reduce the risk and improving the financial performance of the overall supply chain this is again important parameter under economic consideration we are meeting all the obligation related to environment and still we are sustainable right so if we'll talk about finance only if there is a continuous cycle of finance that it is going from your backward supply chain to the forward supply chain then you are because you are delivering the product in that way you are investing you need to pay your vendor you need to pay your raw material supplier you need to pay your manufacturer you need to pay your distribution partner you need to pay warehouse transportation everyone every stakeholder you need to pay when you are ensuring the forward flow of the product but then the sustainability of the finance can be maintained when the reverse flow is also ensured and whatever you are investing you are getting the ROI on that return on investment and then attracting customers who value sustainability this is now many

studies are coming and which are promising that Few customers who are very very conscious about the environmental parameters, they are ready to pay 2 to 10 percent more if their brands are promising that we are more sustainable. we are leaving the minimum carbon footprint right so now this has become the marketing strategy for many brands that if you can record whatever carbon footprint you are leaving and that information on the packaging itself you can display whosoever will buy your product how much carbon footprint you left while producing that product not only for the production even when you made the doorstep delivery how much carbon footprint you left maybe then in that way you can give your inform this your customer this information if you will wait for another day maybe we will go for delivery using cycle right and maybe few extra hours you need to wait so and then if you will say we want immediate delivery obviously we will be using fuel to reach to you so that uses of that fuel obviously will leave carbon footprint so we want to see how many customers yes customers are ready to wait if that product is not in that emergency right and then this is the way how we can make the world more sustainable here is one example of unilever So they are helping the emerging economies such as Brazil and India to wrestle against poverty, water scarcity and climate change. And for this, in Brazil what they did, for tomato growers, farmers, they convert to drip irrigation to save the water. This is what campaign run by Unilever and they help the Brazil farmers to grow their tomato crop. And then if you talk about company has seen almost half of its sales and majority of its growth coming from the emerging economies.

So in that way you can see for sustainability helps this sustainability helps Unilever to improve the environmental and economic health of the market. because they are focusing on how they can minimize the uses of the resources so in that way you will target the sustainability as well and you will leave the minimum carbon footprint walmart is another very good example recently they have started so many initiatives to you know propose themselves as a sustainable organization because walmart when we talk about lot of criticism is there in the market but yes then they are now converting this negative ways into positive why they are promising that hundred percent recyclable energy they are using utilizing to run their facilities to run their warehouses and efficient efficient light bulbs at their stores then they are adding skylights for natural light and then they are reducing the packaging also when you are reducing the packaging one thing directly you are doing is you are reducing the uses of the material which you are using for maintaining that packaging Other than that, when you will use so much packaging, obviously primary, secondary, tertiary packaging and then big cartoon will be there. So that will take that much space when you are transporting the product as well. So if in one container you can ship 100 products, maybe with over packaging you can ship only 80 products, right? So there also you can cut the transportation cost. This is another example where Walmart is continuously working on that.

Talking about the triple bottom line, So, already we talked about we need to take care of the society, we need to take care of the economic parameter, we need to take care of the environment as well when we are talking about this. So, this is coined by Johan, this concept aims to instill transparency in supply chain performance now when we are talking about supply chain sustainability it's not at one point we need to record how much carbon footprint we are leaving it's not that with one stakeholder we need to work on this sustainability it's that means throughout the complete supply chain when we are storing the product for cooling how much energy we are utilizing for transporting the material how much energy we are utilizing for disposing of the packaging then how much environment we are degrading for converting the raw material into finished one how much energy we are consuming in different ways right so how we can do that so to do that we have this one software is there that is known as life cycle assessment software which we can use and at different stages we can record how much energy you are using and how much environment you are depleting so let's say if energy I am counting may be one unit you use to produce that product for producing one unit of electricity how much environment you depleted now may be that energy has come from hydro power station or may be thermal power station if that energy has come from hydro power station may be the carbon footprint will be minimum compared to hydro thermal power station where you are using coal and then you are burning coal and you are converting your energy into heat energy into electricity. so in that way you are depleting the environment while talking about hydro energy also obviously you are depleting the soil fertility so many other impacts are there but yes then we have this software which have all the data and you just supply what operation you are doing how much energy it is utilizing it will calculate what is going to be the impact on the environment what is going to be the impact on the society right and then economic how much you know cost you are contributing when you are doing that function that also you can find out. right so strengthening local activities and competitive advantage how it will help you because when you are near showing your product you need not to transport from longer distance right that also you can save energy same time save resources and then you need to mitigate environmental degradation now maybe there are some industries like if you talk about say steel authority of india limited right so now their nature of the industry is they are continuously degrading the environment in that way that they need to maintain very high temperature to melt the steel and then to turn into different shape right and then obviously they are using coal as well when they are using coal as their primary fuel obviously they are 24 into 7 they are depleting the environment but you see through their CSR activities if you go nearby how they are maintaining the community they are providing them the health care facilities hospitals they are providing them the education facilities to the local community they are providing the employment opportunities they are providing the infrastructure they are ensuring the electricity supply they are ensuring the roads they are ensuring the water supply every infrastructure they are taking care

because they believe that they are continuously degrading depleting the environment let us do this in our CSR and compensate the local community up to some extent so right these are reflected by your policies in the organization right so talking about social measures how we can ensure the health well-being quality of life through your such as supportive work environment gender equality ethical business practices human and labor right so these are few you can add which i talked about regarding sale how they are providing the health care facilities education facilities right so other than that infrastructure how they can ensure human and labor rights are preserved right then environmental measure so you need to identify and prioritize what are the green practices you can do and you need to ensure this not only within your manufacturing unit but also at the supplier end now let's say if we are saying that we are utilizing electrical vehicle to ship the product to do the end mile delivery right so that means you are you are aware about that you want to leave the minimum carbon footprint but you are not aware that the electricity which is supplied to you to your charging station is coming from the thermal power station which is equally affecting your environment right so when we are talking about curving the resource consumption or curving the uses of these kind of resources right fuels which will have minimum impact you you need to take care of the complete supply chain economic measures how we can ensure the financial flow through the supply chain how it can be ensured that once you are putting your money let's say even if you are putting 10 bucks into your business how you can circulate that and provide the product again and again and again that circle and maybe you will come up with more returns right and then expenditure you are managing return or investment here I'm not talking about whatever investment you are doing in your business I'm talking about whatever investment you are doing to maintain the environment now this is still going on debate that whatever we are spending is extra cost to for our organization right if we are moving towards sustainable packaging maybe the cost is little high sometimes the upfront cost is high to set up the initial setup that's why maybe why the single use plastic or that plastic bags are still used heavily because of very cheap right so when you are replacing that packaging and then you are coming with other board packaging paper packaging or whatever options we have which is leaving minimum carbon footprint obviously then you are interested to know if we are investing extra how we can get that obviously you will get in terms of maybe brand awareness Like I always quote the example of Myantra, how they converted the packaging plastic polybag into the paper packaging now they are using and they are writing it at that 100% recyclable, right? So this brand awareness, people will be liking this and they are ready to pay extra if your, you know, brands are doing that. so obviously this is the holistic development when we are talking about the TVL approach triple bottom line approach right and nurturing business integrity across people profit and planet so key advantages include reducing the carbon footprint and energy expenses obviously the very first basic step is how we can minimize the utilization of the resources reducing the resources usage obviously will leave the

minimum carbon footprint even if you are continuing through the same thermal power station but earlier whatever energy you are using now you are reducing the usage obviously you will be more sustainable and then in between maybe we can look for some alternative right which can be more environmental efficient enhancing brand image and productivity so initial investment is high but yes many across many business units they have implemented this and like star is another example where they are you know promising the customers and they are asking them to come with your their own cups or maybe dedicated customer dedicated cup is there so that use and throw culture can be eliminated they are saving up to 50 percent in that right so many examples are there right then paving the path for future growth and financial security so how we can ensure that whatever ventures we are into how we can ensure the financial sustainability and then we are growing in that demand right so brand image is created not just to attract the customers that same brand image now can be created to attract the investors as well where investors are looking positively towards you see right now if Indian market stock market you are investing green mark you know investing into green shares right so obviously whosoever is talking about green energy or something like that people are buying like that so their price is increasing right so five frequently cited business activities that benefit from sustainability is obviously first is your supply chain operation so obviously companies set emission targets with suppliers and help them to identify the potential areas for improvement what is the situation right now you need to record that and then how we can slowly slowly we can eliminate those setups we can eliminate those activities which are producing more carbon footprint print right branding like i told you because customers are ready to pay 2 to 10 percent more if your supply chain is promising that your product is greener your product is sustainable you are not depleting the environment you are doing the end mile delivery using electrical cycle or maybe normal cycle right and compliance when obviously you are recording the matrix sustainability matrix obviously you will meet all the regulations whatever are required if you are dealing with those kind of industry even if you are dealing with electronics industry pharmaceutical industry where you are producing the hazardous material even there are guidelines how you can dispose of that hazardous material right Then you can do this only when your complete supply chain is maintaining the transparency and visibility like these many 10 packets we produced as byproduct and then already we had disposed of those 10 packets using this process.

then investor relations already i talked about has positive impact on the stock price if you are working towards that now investors are realizing that so next decade is obviously dedicated to sustainability measures whosoever is implementing that may be more brand visibility will be there they will fetch more projects they will fetch more market share they will grow in that way our money will also grow if we will invest into those kind of organization and then corporate culture sustainability if your main theme you will

implement this theme into everywhere even if you are talking about hr practices you will try to hire and retain your employees for longer period of time your policies will be in that way you can ensure you know the sustainability in that also right so that is a corporate culture or value so whenever we are setting up our mission or vision statement can we highlight this main theme into our vision statement that we want to be 100% you know on recyclable energy after 10 years or like so right or we will be replacing this material plastic completely from the packaging and will use this paper packaging or some other advanced packaging which may be efficient as well as have minimum carbon footprint right so that culture we need to set up talking about key matrix for sustainability carbon footprint you can calculate the total greenhouse gas emission produced by the supply chain operations at different stages you can record and then you can track right and then you can identify those stages which are producing higher carbon footprint energy consumption track the amount of energy that you are using at each stage again will help you to find out where you are consuming maximum energy right and if this is the maybe transportation you are consuming the maximum energy so what is the alternative what is there any alternative fuel other than petrol diesel we are using that we can use that and we can minimize the carbon footprint right water uses how much water consumption can be reduced that water consumption right waste generation whatever byproducts you are producing how you can first target should be how you can minimize that if not possible to minimize how that byproduct can be raw material or inputs to some other organization may be the byproduct or waste for your organization, but can be, like one example I would like to quote here is, like sugar industry, they are processing the sugar cane, and then they are, ah, producing sugar but after producing sugar that sugar cane husk that is there that they are just throwing or burning in the open land so that is generating you know again depleting the environment generating pollution right so how that can be utilized same way we can burn within the furnace and then when we can use that energy to convert into electricity and that can be very potential source right maybe still that will deplete the environment harmful gases will be emitted but that much energy we can create out of that and we can minimize the impact also instead of burning open in open field what we can do we can burn in the furnace and whatever the black smoke is coming we can pass that black smoke through the water and that infectious harmful whatever elements are there will retain in the water that water we can use sometimes that can be used as fertilizer if not possible we can go for deep burial of that water right so this is how we can utilize right supplier diversity how we can diversity why the supplier based on location size quality ownership quality right variety that we can do ethical sourcing you need to go for those kind of vendors which are ethical in way they are ensuring the labor practices they are ensuring the sustainability supplier compliance how your suppliers are complying to these regulations are you asking the sustainability report while they are producing the product you should ask that with every lot you need to send the sustainability report so that we can find out how much carbon

footprint they are generating when they are producing that raw material and you can add into your matrix right product life cycle analysis so throughout your product life cycle from the introduction start to the maturity growth maturity and decline stage how the product is passed through different stages right and then you can record how much environment you are depleting transportation efficiency already i talked about we have different types of mode of transportation how we can use intermodal of transportation so that we can minimize the environmental depletion so if we'll go by ship we have seen that it will be having minimum impact on the environment but then again whether we have that infrastructure or not right wherever possible we should go for it and then social impact So, social impact, it's not only directly we are looking for how much environment you are depleting and then they are living there. Again, if your workers are working with you, how you are protecting their interest is also, forceful labor should not happen, child labor should not happen, that also you need to ensure. so these are the six drivers we talked about in detail but how these drivers will be helpful to implement the sustainability into your supply chain we'll see facilities now like i told you walmart utilizing the efficient light bulbs to retain their facilities to maintain their facilities right so through your whether we are talking about manufacturing facility we are talking about warehousing facility so how those facilities if you are using cooling system if you are using lighting system how you can ensure the minimum consumption and then you can ensure the recyclable energy inventory we are keeping the inventory because we are not sure about the demand how we can implement the latest software to go for predictive analytics and then we can predict the demand 100% so that inventory we can minimize transportation already I talked about we should use that mode of transportation which can carry the maximum weight with minimum time and minimum carbon footprint should be there sourcing like Starbucks I told about they are collaborating with those suppliers which are socially responsible which are environmentally responsible and they are sticking to all those parameters information important element because if you will not measure whatever carbon footprint is throughout all the stages you cannot control so reporting and measurement are two basic steps we need to go for pricing So now this is important that how you can if you are spending little extra how your customers are ready to pay for maybe initially you will struggle you are going for initial investment whether they will support you or not right. So but yes again we have some studies where customers are taking it these initiatives in a positive way. So we have seven ways to improve the supply chain sustainability.

First is find the current pain points of your supply chain. Again you need to find out, you need to calculate the product carbon footprint at each stage and point out what are those stages which are contributing maximum. Then optimize transportation. How you can do that? Nearshoring. You ensure the minimum transportation, ensure the maximum capacity you are utilizing of the vehicle, ensure how you can utilize the electrical

vehicles.

And how you can do that? We have software which can easily figure out these many products you can carry in that container leaving the minimum space available. vacant right how this is how you can ensure this is you can see the latest study done in us where it is showing that 29 percent only transportation part is contributing toward the pollution right depleting the environment carbon footprint leaving right so collaborate with sustainable partners how you can collaborate with those partners which are very strong socially environmentally right ethically whether they are maintaining GRI 408 409 norms child labor practices how they are ensuring how they are maintaining the record they are not going for forceful labor kind of practices and then they are also ISO 14001 certified says that they are taking care of their environment they are taking care of the byproduct they are leaving in the environment right so How you should, you should request your vendors to submit your ESG reports, carbon footprint, PCF verified, right? So that you can just mention that information while producing these many raw materials, this much carbon footprint was left out. minimum inventory so if you are not keeping inventory these heating cooling and lighting facility are not required but yes then we are maintaining the inventory in the shop we are maintaining the inventory if you talk about milk products morning to evening that refrigerator is working because customer can come anytime so that means how we can minimize so that also is another point reuse waste or byproduct as raw material not in your company then maybe in some other company if you are using plastic bottles to pack anything right juice or simple water how easily you can ensure the recycling of that and then use environmentally friendly packaging material and the reason i mentioned because we are utilizing this plastic bags because very cheap but the basic point is only one percent of plastics are biodegradable so if you are throwing it in the environment it will be there only so will be depleting the environment for longer period of time so how we can shift to some other material packaging which we can destroy easily or which we can utilize or we can recycle that packaging right we need to nudge our regulators and consumers so that they also contribute into that and consumers we need to make them aware that if we are spending extra by green sources automobile companies or if they may be the hybrid cars we are coming up with the electric cars we are coming up how we can ensure that our regulatory authority is also putting pressure or maybe they are supporting the customer as well if you are buying petrol version maybe 27 percent tax if you are buying maybe your electrical version maybe 10 percent you see the major crowd will shift towards that this is very simple way and anyone who is buying car will be using that car for minimum 15 years that you are ensuring that for next 15 years that person is not going to deplete the environment but yes that government has to take the initiative and has to spend and has to minimize their share right so this you can see starbucks they reduce the plastic consumption by 50 percent like i mentioned they ask their clients to bring their own cup

right so and customers are happy to do that challenges cost initial cost is big challenge smaller companies cannot think about that because of initial investment then there comes the role of the government agencies how they can support them investment in sustainable practices for long term we should not be very after this your return on investment so quickly it will take time to get that returns right and then it is impossible or maybe very very hard to find sustainable option for few companies right i talked about steel industry where you are continuously burning coal and then you are depleting environment you are extracting ore from the core you are depleting environment in that way so in that way how you can compensate in some other way complexity in transitioning to sustainability that also because very clear norms are not there today the regulatory bodies are also coming with few norms tomorrow they will change something else so they are also not sure about that and then there is obviously resistance in change that is quite obvious and lack of customer interest is also sometime putting a challenge if you will replace the packaging and will ask the customer to pay extra maybe you will struggle initially so we have two major trends as far as we are talking about sustainable supply chain one is circular economy where anything that is entering into your circle should not leave as waste how you can ensure that there should be no waste either you after let's say here it is end of use after end of use that should be either diverted to some other industry where that can be used as raw material or may be in the same industry you can recycle This is one approach. Other is data-driven supply chain where we can implement cloud-based system IoT devices, how much we are generating waste, where we are generating waste, how we can channelize that waste, and then we can ensure the minimum impact, right? Right now, we are not.

.. so sure how much waste even municipal waste we are generating if we will talk about all the households whatever are there in one particular city forget about the collection when you are not sure about the quantity they are generating so this is the latest this study survey done by one team and we are talking in that case study right so They observed that many executives they have long term vision for sustainability goals but what challenges they are facing is first is your upfront cost and a lack of a clear business case to support sustainability expenditure. So clear there is no case to support because they are worried about their ROI. And then, you see, they are looking that this supply chain can play a very important role to, you know, address your environmental social economic parameters but yes 8 of 10 executives are increasing the effort but they are struggling to figure out when we are talking about the return on investment what we are getting so sustainability supply chain it is not only about the procurement that green suppliers we need to develop throughout the supply chain you need to record how you can minimize the cost how you can increase the revenue how you can mitigate management of risk and then intangible benefits as brand reputation and innovations are always there so this team suggested who did this survey five action first is you organizational commitment towards

sustainability improving visibility and traceability throughout the supply chain so that we can record where we are leaving how much carbon footprint expanding ROI measurement not only in one term that how much market share we are getting we need to find out market share we need to find out brand awareness we need to find out sales growth and all other different measures right and then leveraging tax incentives and grants this should be ensured by the government so the big companies they are also focusing on this transparency public facing sustainability goals and financial benefits are they have already realized and they have increased the revenue and improved the brand reputation as well and you can see 55% of supply chain executives say that they expect to see better management of operational risk within next 1 to 3 years adding more than 20% who have already seen these reductions right so this is how you can improve the figures are there yes it will take little longer but yes the benefits are there and why they are doing that 61% they want to save cost that's why they are going for sustainability they want to reduce the consumption of the resources compliance with regulatory authority 51% pressure from partner and suppliers they want to highlight their product as sustainable 40% and you can see there are so many other reasons why now these companies are going for sustainability so we can conclude that obviously the awareness of environmental social and governance issues not only among the services or product providers but also among the investors and regulators should be there So that customer should also be aware and they should be you know providing a helping hand in terms of if they need to wait little longer they should be ready to wait for little longer. Then obviously when we are talking about sustainability measures the initial setup cost is high but over the period of time if even if you can channelize your byproduct you can make revenue out of that. right so again optimizing resource utilization reducing cost and enhancing efficiency obviously will boost your economic activities and will develop your resilient supply chain right we talked about the resilient supply chain and how we can move towards that the basic things we have circular economy concept we need to implement we need to support our supply chain should be our data driven supply chain data predictive analytics we should go for where how much is required so that we are not maintaining extra and that extra should not go as waste into the environment so this is the overall perspective when we talk about sustainable supply chain so these are the references you can go for further reading thank you very much