Logistics & Supply Chain Management

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Lecture 59 : Emergency Supply Chain

hello dear friends welcome back to NPTEL online course on logistics and supply chain management so today we will discuss about a special case of supply chain where we are talking about the emergency supply chain right and obviously already we discussed various aspects of supply chain now towards the end we will see how if we are talking about some emergency situation in terms of any natural or manmade disaster, how the implication of various concepts in the supply chain will be different. And we will talk about special case of humanitarian supply chain, how we can meet the demands instantaneously whenever any disaster is happening, and what are the priorities we need to address. And we will again discuss one case on this. So, emergency supply chain, any complex emergency as defined by joint logistics enterprise is a wide array of international conflict in terms of cross-border whatever is happening, humanitarian and domestic disaster relief scenarios. where may be we are talking about natural disasters or any domestic kind of disasters right and then we are talking about involving combinations of warfare situation or food insecurity or pandemics or any social conflict right so these are some of the situations where we need to come up with our emergency ah planning right in terms of when we are talking about how we can deliver the required products and services to the end customer right not to the end customer we will not say here customer but we will say the affected people right so the scenarios can be characterized by few points like combination of displaced people will be there obviously in recent covid 19 pandemic also we have seen that when that started bursting in the urban areas big cities right people started moving back to their villages right and in that way you see when people and because of the industry shutdown also they lost their jobs right and complete shutdown was there so it was difficult to survive there because the cost of living is high in the cities so they decided to move back to their villages and in that way that virus is also transferred to the ruler areas as well right so this is one characteristics one situation i am talking about that but there can be so many other situation right but yes whenever we are saying that communities are affected then they the communities are also displaced from that particular location wherever that disaster is happening and obviously the scale of this damage is at large scale and then the hindrance of intervention or prevention due to political scenario also right then like right now whatever is happening in Bangladesh right so any other country or any other relief organization which wants to you know protect the people or may be want to give them

some supplies or protect their interest cannot operate directly because of the political scenario there right and then security or infrastructure constraints are there obviously there is threat of loss of life right so how quickly we can meet those affected people with our product and services we can those people will survive based on that right. So, obviously, we will talk about assistance is required at very large scale right.

So, any emergency supply chain refers to a specialized logistics framework established to address urgent and unforeseen situations right this is the basic difference when we are talking about your normal supply chain and emergency supply chain in normal supply chain usually also there are disruptions right but yes those disruptions are there and somehow using predictive analytics we can analyze and up to some extent we can find out that this is going to happen and we can come with the preparedness strategy but this is kind of emergency situation where natural or manmade disaster is happening we cannot predict the scale we cannot predict how many people will be affected what could be the area that will be affected and after once that area is hit badly by the disaster after that what is going to be the demand and demand is also for segregated products right so it requires very rapid mobilization of the resources coordination of stakeholders many are there obviously military organization are also working government organization are also working some ngos are also working individual are also working to help that society right the affected people so and then deployment of essential goods and services to the affected areas or population so obviously the primary objective of any emergency supply chain is to reach their timely and effective way so so that that disruption impact can be minimized right and in terms of how quickly we will respond those many lives we can save So, this may include when we are talking about emergency supply chain, we have to ensure the huge inventory of those necessary items and then we have to come up with the alternative transportation routes also, alternative facilities also, sometimes we need to come up with the temporary warehouses also distribution centers also and we have seen like earthquake or flood this is not one time event some sequence events keep on happening after two days three days again there is small earthquake or kind of things again you are setting up the distribution channel and that is also disrupted right so obviously how quickly you can come up with those temporary kind of facilities alternative transportation routes obviously if your road connectivity is totally damaged it will take time to again you know again reassure that road connectivity during that time how you can ensure the medical supplies how you can ensure the food packets and other necessary item so emergency supply chains are primarily composed of two basic domains right first is military obviously operation will be there and then to support the non-government and disaster relief organizations so that they can reach with their supplies to any disaster affected area So, this supply this cycle will help us to you know connect the different series of events how the things are happening. Here see the disaster is happening and we need to respond quickly. Respond in terms of first we need to search and rescue. whosoever is left behind

life is there we need to search how many people are still are you know life so we need to rescue them and then we need to find out the need assessment and this need assessment is something may be if you are covering 10 kilometer affected area you are not finding even single human being which is requiring this these kind of supplies but then again you will find one group who are waiting for these kind of you know supplies and then your demand will be based on that and then again you are never sure how many people you will find on the way what are the requirements if someone is struggling to even survive after that disaster so medical supply immediately is required and then also medical supplies what are the medicines you are providing sometimes may be life support system is also required which obviously we cannot transport to that particular location as we are not aware what kind of medical equipments are also required if we are talking only about the medical supplies right then a resource mobilization will happen and will start the relief operation this is how we respond to any disaster but when we start recovering after 4 days 5 days slowly slowly we are recovering again we are rebuilding and reconstructing so first thing is we need to set up the channels and in that it is very important to set up the communication channel right so because there is no electricity there is no internet connectivity no operator telecom operator is working because of everything is damaged so that means how you will set up the communication so maybe nearby distance you can come up with some bluetooth devices you can come up with some wifi those devices which don't require you know connectivity or maybe you can have some variable devices which you can you are bearing those wristbands and then you can track that there is life is there right so this is the first thing and then once communication is set up then you can communicate this information to all the stakeholders to government organizations to NGOs to industries to individuals who are working to you know provide those relief operations to the affected people so then again we can provide this information that these many people are there this these require this much medical supplies this much serious cases are there they require immediate air ambulance kind of thing so how we can come up with maybe helipads we need to come up with so that we can shift the people from that affected area to the safe location right so this is how we will again rebuild and reconstruct then mitigation so this we till now we were talking about the risk management right the emergency management situation has happened and then we are taking the measures but what is the lesson learned how we can prepare for this if any natural disaster is happening right how we can first thing is how efficiently we can predict if that we can predict how we can prepare after that right so maybe intermediaries up to what extent we need to set up the temporary locations right so this is how will come of the mitigation and for the next time we should be prepared we should monitor the event what was the scale of that disaster we should forecast if that much area is there we need these many supplies food packets these many are required medical supplies these many are required to set up the telecommunication network these many days minimum required to set up the road connectivity and to send the ambulances these many

you know days are required so that lead time you can calculate for each activity for each operation and if that lead time is high you need to stockpile you need to keep the inventory you need to keep the supply until those people are still in the infected that affected area and then you need to come up with the contingency planning if you are starting the relief operation and suddenly again the second floods come then again you need to come up with the contingency planning and then logistics capacity assessment you need to keep on another very important parameter here is when we are talking about emergency kind of supply chain waste is very high always right because you are not sure how much supply is needed and then because people are so sometimes emotionally they are taking the decision so over some products are over supplied and some products are never reaching to the affected people So, again these two quick videos I have introduced how UNICEF is helping the you know disaster affected people and through their emergency and humanitarian supply chain operations and another video is how drone technology or AI enabled solutions can be implement to you know provide the immediate relief operation.

so just you can go through these videos when we are talking about obviously providing the different supplies we need to prioritize which supply should be first if it is normal situation we know that food water warmth is the first basic necessity for anyone to survive if those needs are met then we are looking for the safety security right if that is also met then we are looking for the society well beingness community where we can interact and then are the self-esteem and self-actualization stage where you are as a human being continuously evolving are adding more into your luxury and how you can satisfy your yourself your egos or whatever right so means you are using so that is national theory how you can target that but when we are talking about emergency kind of situation the first thing is we need to supply air if there is no air disaster is kind of if many times with these news are there that child are falling in the bore well so then the first thing is we need to ensure the air supply to that child right and then if air supply is ensured then the second on which our life is surviving is heat is required how we can ensure that if that is also done we need to go for water and food supply And then we will talk about the medical supply, how we can recover, maintain the health of the person who is suffering from that any type of disaster. So this is how we can prioritize the things. Based on that only our relief operation will depend. now why a separate this supply chain framework is required when we are talking about your any emergency kind of supply chain so first is if we will talk about disruption versus emergency supply chain when we are talking about disruptions like labor strike is there unavailability of raw material any accident is happening on the road your train was shipping the material anything goes wrong with that shipment quality issues are there anyhow anything that is happening disruption is happening and your smooth flow of your product is interrupted that is kind of disruptions can happen through the supply chain and all these till now we have gone

through 58 sessions and we have seen how many different types of disruptions can come when we are talking about supply chain and how we need to manage those but whatever is happening still the identity of the supply chain remains the same and same stakeholders are there if an equality issue is there we need to strengthen our vendors if our manufacturing is at fault we need to come up with the new technology if there is something wrong with the packaging and the product is damaged during the shipment we need to change the packaging we need to strengthen the packaging more right these are some of the measures usually we were taking but when we are talking about emergency supply chains which are we are initiating this process once that emergency has happened this is a kind of responsive supply chain once reactive kind of thing right so here the basic point is how quickly we can come up with our emergency supplies And obviously, we don't have much time for planning. Obviously, we don't have much time when we are talking about supply chain, coordination is required, collaboration is required, transparency is required, forecasting is required, data analytics is required.

Those concepts will not work because we don't have really... much information right so once we will start setting up our supply chain over maybe on the way we will start realizing that these many people are affected this much area is affected for this long period we need to ensure this supply chain these many facilities warehouses distribution centers are required so obviously then military units and disaster relief organizations are also coming quickly for this and as a supply chain manager you need to decide where will be your new location, distribution routes, alternative transportation modes through drones you can ship the best ways you can go with the drones right and then maybe helicopters maybe somewhere you can come up with the helipads and then you can ship the maybe ship the medical supplies to that defected area and then maybe after some time you may then transport all the lives whatever is left there you can come up with the kind of air ambulance things right so disaster relief supply chain respond directly to emergencies forming connections and relationship to address the any crisis right so this is obviously the special case once it is happening then we are taking the counter measures so again we talk about the objective of conventional supply chain and any emergency supply chain so very first objective of conventional supply chain is we should right product right quantity right price right time at right location right so these are some of the points our conventional supply chain is working around and you have to be cost efficient services should be at top level door step delivery if customer is saying no to your delivery you should ship back that material and you are not going to charge customer and you are still you are claiming you are efficient you are saving cost you are doing sustainability measure all those things are there we are talking about sustainable packaging we are talking about all those things right but but you just imagine the flood situation and then we are talking about services level no we are talking about the cost efficiency no we are talking about one are you even sure what kind of supplies we need to supply and what is

going to be the demand no so at any cost you are ready to ship the material so this is how the emergency supply chain is different from your conventional kind of supply chain where we are talking more on effectiveness and efficiency so success in emergency supply chain is primarily about achieving results quickly how many lives you are saving that is your success but not how much cost you save that is not success right even if one individual is left behind even if you need to go by helicopter and rescue him you have to do that you need not to care about the cost right and obviously here we are talking about faster shipping methods so if many helicopters are required you need to do and we are not talking about economies of scale so many times we are less than truck loading shipments are going on obviously we cannot talk about and if you will supply over material that will be waste right so In that way this emergency supply chain is very very complex and challenging and the concept of if we can somewhere apply the implied demand uncertainty will be very very suitable to define this kind of. supply chain implied demand uncertainty we discussed about where we are promising of supplying the products or services in emergency only right so in that way you have seen that the there is one demand uncertainty which in conventional supply chain we are handling and this is implied demand uncertainty where we our focus is not to be cost efficient but how we can quickly provide the services so if you talk about the uniqueness of these emergency kind of logistics what are required basically we can divide into major four aspects and the first is urgent relief situations so diverse and immediate services are essentials why we are saying diverse because medical supply will be from pharmaceutical industry food supply will be from food industry water supply we need to ensure electricity we need to ensure communication we need to set up other medical equipment we need to set up we need to ensure the services as well doctor need to be you know there who can examine the situation and can define these many people can stay back can stay little longer these requires immediate air ambulance right so these kind of you know diverse and immediate services are required and then timely availability will define how much success rate is the survival rate of the affected people who are fighting these death situations right so this is first aspect and then you need to see accurate real time information that also required now when we are talking about all the you know kind of softwares kind of touch points throughout the supply chain we are you know recording different data and then you can apply the data analytics how much demand is there but really can we do that when there is a kind of situation of kind of flood earthquake or any disaster because those setup infrastructure is already vanished now how you will collect the information how quickly you can go for that right so that is also very important point how you can address this issue right now another point is prioritized service efficiency over profit that already we talked about the next fourth point is there has to be collaboration between government public organization firms individual whosoever is searching i have seen this situation when that flood happened in uttarakhand and in somewhere around 2013 or 14 right so during that time you just imagine that that was relief operation was for more than one

month or so so if every day you are coming up with the bread packets how people can survive on same bread packet for 30 days you just imagine so and then all are coming up with similar kind of medical supplies but then that cannot address the because the situation may be different right so if we and then individuals or firms or organizations they want you know this is again the concept is they want to go on that ground and then want to help them people that make them more satisfied but yes then how we can collaborate that someone can ensure the complete medical supply chain someone can ensure the complete food supply chain water supply how and if some air ambulance is required how the transportation can be managed so that that uniform system or unified system is there so that collaboration is required so this is the fourth angle when we are talking about emergency supply chain so what can be the solution Obviously early preparation and precautionary measures only up to some extent we can maybe natural disaster we can predict.

Sometimes man-made disaster, war situation also we are getting ready maybe like what is happening in Ukraine and Russia. So world is aware and when they started you know long back one and half year or maybe now two years and now the situation is coming between Israel and Iran as well. so we are aware that this can happen so future this supplies can be interrupted there are also people who are living in Iran and Israel if that situation happen where the chances are very very high so let us you know stockpiling the inventory so that if that goes on for six months or one year we can survive our military can survive so we need only not only ammunition is required to fight the war right so your other medical supplies your food supplies your all those things are required right so obviously if that comes under early preparation how you can prepare that so well established emergency supply chain system which is based on the transparent communication right and how you can reduce the time energy and financial investment right whatever you are investing into labor r&d or resources that whatever you are doing so if that collaboration or streamline communication is not there obviously many resources will be wasted right so we talk about some software we can develop but yes it infrastructure is again in question if if your that IT infrastructure is also damaged then then how quickly you can set up the another support system right then financial support is coming from different organizations how that can be combined can be channelized how we can strengthen the communication among different aid enterprises NGOs individuals industries and governments and if that is done through upstream and downstream so we can ensure the regular smooth supply of the all those food items grocery items and then your medical supplies there will be no panic buying there will be no extra stockpiling right that can be ensured so establishing collaborative supply chain mechanism such as message based system or electronic procurement hubs enables effective communication and coordination so maybe long term communication will not work so how we can quickly come up with kind of walkie talkie system or bluetooth devices who can connect

with the nearby this another concept here is humanitarian supply chain which is defined as buying and delivering requested supplies and services at the places and time they are needed right and when they are needed obviously if any that kind of situation emergency situation happens and obviously to survive them they need food water shelter this is the basic thing they need right so obviously your humanitarian supply chain will target immediate you know immediately how you can meet the needs of those people with medical assistance transportation services evacuation services water food and medicine supplies so we have to work on two different angles one is your technical perspective where we need to plan information gathering warehousing pre-positioning transportation distribution whole supply chain we need to set up maybe it is a kind of temporary supply chain so you need to take decisions in that way and then strategic decisions you need to go for decision making from where you will outsource from where you will buy with your collaboration with your raw material inter-organization cooperation public private partnership how you will keep eye on that right so obviously this is humanitarian supply chain is lifeline in any crisis if you will talk about few crisis what happened in 2015 in nepal earthquake and you can see how the air and unconventional methods they used air ambulance as a main transportation means to supply the medical supplies and food packets and that same helicopter was used to transport people from the affected area to the relief camps so that was another example So, how you can again come up with rebuilding your communities by transporting construction material that is on the later stage that again that construction and those resources are channelized to that affected area. There is again Hurricane Maria struck Puerto Rico in 2017 and that also after that how they ensured the power grid and communication was the first priority because once you will supply that your medical equipments will also work on electricity only. right so restoring infrastructure in terms of then you need healthcare facilities permanent kind of healthcare facility again for better life schools livelihood and all those things comes later that you need to set up but yes part of supply chain that will go on for another five or ten years maybe one decade right so what are the challenges when we talk about we are never sure about the demand how how much it is going to be on that maybe how much area is affected we can say somewhere population roughly is this much right but how many survived after that disaster that we need to find out because we need to immediately address their needs right so you can see how during ebola outbreak in best africa there was sudden surge in the demand of medical supplies and that supply chain medical supply chain faced that situation and that was overburden and then limited access to affected population if something is happening in the rural areas right cloud bursting or these kind of events are happening in rural areas right so already there is limited access so how you will come up with the airdrops kind of solution or mobile distribution this is another very good example what was done in Rohingya refugee crisis in Bangladesh there obviously setting up that big healthcare facility was not possible so they come up with you know mobile your medical supplies mobile kind of healthcare facilities right

and then they serve those people Domestic barriers and delays are also there kind of politically sometimes situations are so regulatory norms are there you cannot easily you know cross the borders with your supplies right that also should be regulated which is you know time taking thing right.

So that also sometimes is a big hurdle to directly address the situation right. what can be the other challenges already I told many organizations are involved if those can collaborate on common platform so the efficiency of that relief operation can be enhanced obviously inefficient collaboration is the main reason fraud some organization are there saying that supplies are done but still the affected people are not getting that is very unfortunate part of this humanitarian supply chain if we can centralize the system we can implement blockchain enabled supply chain obviously we can ensure the transparency throughout visibility throughout the supply chain And cost inefficiencies are there. Majorly, we are concerned about the waste that is being generated through this, right? And lack of trust between other organization. If I'll just donate the money, whether that money will directly go to the affected people or not. That is another point.

so how humanitarian supply chain is working you can say response in natural disaster what happened in 2010 Haiti earthquake so coordinated supply chain facilitated the distribution of aid leveraging pre-positioned supplies and collaboration with local stakeholders to save lives and aid recovery so you how swiftly you are ensuring the delivery of the medical supplies food supplies and shelter so refugee crisis management again if you remember about the ajitari refugee camp in jordan so again in collaboration with the local authorities and innovative solution because if you are buying your supplies during emergency through overseas or through you know long distances it will take time and when you are you know the situation is so you are not sure about the demand you are not sure about the supply you are traveling so long distance so that become very ineffective right so how nearby nearshoring is very important in that case if you talk about food water how nearby you can find out some vendors who can quickly pack the food items and can deliver How you can ensure the water supply? Healthcare nearby hospitals can come up with the foreign field kind of hospitals concept, right? Where they can set up some temporary locations and they can serve the people, right? So this is healthcare supply chain. Again, during COVID-19, we have seen how that was important. Like we came up with the testing center so many overnight. We came up with foreign field hospitals. We came up with so many vaccination centers at different location.

How supply was channelized. Different players were there. So we need to keep the record. Who has taken the first dose of this vaccine? Should we ensure that he should take the second dose of the same vaccine? This was very important. best example how we

can respond in those kind of situation and healthcare supply chain right but yes there also we have seen that although there was limited supply we were waiting for the supply still there was wastage right so how that wastage of that kind of crucial product life saving drugs we can ensure so general steps if we will talk about humanitarian supply chain first is you need to assess what is the need assessment size how much is required quantity how much is required how many people are affected how much area is affected that way you can define then you go with your planning from where you will source that strategy you will develop which transportation mode you will use what is going to be the delivery schedule everything you will define then comes sourcing So obviously, already I told you the best option is you should outsource to the local players so that immediately that supply can be ensured.

Then procurement will happen. Obviously, negotiation is not taking much time here that we need not to negotiate on cost, but yes, quality and testing should be done your food supply should not deteriorate the health of those people who are already you know on the verge of dying right then transportation is again challenged road connectivity is gone air connectivity you cannot go directly so maybe helicopter can take limited supply so how you can ensure that and temporary warehouses how you will set those temporary warehouses from where you can distribute through your local partners communities organization but again if this process is done we need to keep on monitoring and evaluating so that that wastage which i was talking about that can be minimized and next time we can improve the process right so these all steps already we discussed and information plays very very important role that's why in the first or second slide i mentioned that first thing you need to ensure how quickly you can ensure the communication flow right that information how quickly you can restore the connectivity that is major point so when we are talking about humanitarian cargo these are some of the relief items which are required we are carrying in the supply chain medical supplies housing and shelter, wash items are required, sanitary pads are required and other things are also required depending upon the you know location and all that dangerous items also sometimes you are transporting organization support food quantities are required ready to use foods are required some fortified foods are also you are preparing so that you can enhance the nutrition in that and that can be provided to the affected people right so this is a very interesting diagram how you need to approach to disaster area let's say this is the disaster area so up to this i'm setting my supply chains right major houses i'm setting up to here so because this is disaster area maybe i have to locate my distribution center warehouses local distribution center at different location so i'm meeting the demand of the local people there right so this is how it is happening so let's say again there there is disaster and this much area is again defected so if only this much area is affected this time so still this supply chain is working efficiently I can utilize that supply chain so up to what point our supply chain is damaged we need to work after that and we

need to ensure up to that point we need to ensure the regular smooth supply as well and to affected area also we need to take care so this is a very again kind of interesting case study how the flooding situation happened recently in Australia and thousand of people they are flood affected and they are falling short of your you know the fresh food items right already supermarkets They have introduced the buying limits and out of stock they are everywhere. So this is not new situation for Australia because during COVID-19 also they have experienced the same situation. And their agencies have warned Australia that because of this climate change, drought conditions, fires, heat waves this situation will come on you know so frequently right so we have to come up with the kind of you know alternatives so right now the government is only depending upon the main food industry and then obviously when they are this is the only source and then they are saying that drought conditions flood conditions will happen so then they need to find out the alternatives where they can stockpile the inventories and so right and because of this situation now the highway is also blocked like i was talking about the situation how you will ensure the food supply and all those things you just imagine the situation how you will ensure that right. So, that is again big challenge.

So, this is we are talking about a kind of resilient food supply chain where we are talking about how our farmers can produce regenerative kind of products which can ensure the again, you know, that the soil is maintaining the all the fertilizers then we can decentralize food supply chains so that everyone can get the access to it we can set up some local and regional supply chain partners we can diverse the food supply items instead of buying from one player we can buy it from other players then we can ensure the equitable access to food to everyone right to food government has to ensure through their you know activities what they are doing circular food economy any waste is there how you can ensure through your close loop supply chain this is complete supply chain if that those steps can be implemented we can ensure that we are into resilient food supply chain if anything goes wrong even then we can sustain with our supplies so these are the references you can go and thank you very much