**Logistics & Supply Chain Management**

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**Lecture 10 : Tools for Improving Logistics Efficiency**

hello dear friends. Welcome back to NPTEL online course on Logistics and Supply Chain Management. I am Dr. Vikas Thakur, Assistant Professor, Department of Humanities and Social Sciences, IIT, Kharagpur. So, in the last session, we discussed about the key performance indicators in logistics function, right. So, what are those parameters? Any organization working in this area and or delivering product or services at your doorstep must look on those parameters or maybe must try to follow the best practices in that industry keeping them as benchmark and then we have explored all the functional areas in logistics like transportation we discussed about we discussed about warehousing we discussed about we discussed about distribution performance indicators and then we discussed about the overall supply chain or logistics performance indicators.

So, now, in this session it is very important now to find out some tools which can help you to you know improve those performance indicators right if you are lacking somewhere how we can improve those indicators so in this session particularly we are going to cover right so i have picked some very famous tools we are using in operation management and i have tried to use those tools in improving the logistics management performance right. So, very first is plan do check act cycle which we will see what are those different stages right and then very famous 7 QC tools we will use quality control tools. how we can improve the quality of shipping the product packaging the right product and right packaging also right and then delivery on time and then accurate delivery right so these So, these all things whatever KPIs we discussed we will try to you know manage those KPIs using these some of the approaches right. And then famous framework is quality circle, then we will discuss about how we can benchmark the best practices in this industry.

And then finally, we will be concluding up with the you know how we can improve the overall performance or the if we will talk about the total quality of this complete logistics network right so we may spend couple of session on discussing these techniques so just go through the quick introduction so quality is basically there are two different definitions one is for the customer other one is for the product supplier the manufacturer who is offering the product to the market right so we will go through these two different concepts right so quality control is a crucial aspect of logistics management to ensure that

product reaches the customers and with specified standards and quality right so if you are receiving any package at your doorstep and then if you did not even open that packet and that is damaged so this is something will give you you know very bad impression to the customer and that brand image will be hampered if we are you know we cannot afford on ordering maybe kind of delicate products using those courier services because they never care about your packet right so that kind of perception comes in your mind and when you see okay we will buy these kind of products so we will not buy through online platform we will go physically we will check and then we will get it home delivered with proper care right so that should not happen so only that that will happen only when we are taking care of those specified standards and quality right so obviously we will talk about these quality measures in transportation warehousing inventory management material handling and packaging So, quality assurance is a procedure to ensure quality of products or services by preventing mistakes and defects right in the products. And when we are talking about the logistics, so obviously, because manufacturing right now we are not considering as part of it, then we will talk about complete supply chain obviously, manufacturing will also part the part of that right, but right now let us focus only on the correct deliveries to the end customer in the the product should reach in the right shape right. So, when we define quality we can define fit for purpose right first time fit for purpose means for whatever purpose it is intended it should fit right you it should be readily usable right. So, your distribution network should provide the delivery in such a way that once it is reaching at your home you are getting that product you can plug and play kind of system should be there. Right first time that there should not be any chance of mistake right in that.

So, you should be very right in the very first time you cannot just ring the bell of the door of someone else and then you are saying oh sorry this is not yours order. I mistakenly, I have just knocked your door wrongly. So, that cannot happen. So, you have to be correct in the very first time. So, just going through what is the concept of quality, I told you there are two different perspectives, producer perspective and customer perspective.

Producer perspective, their main focus is on conformance to specifications. so if i am saying that you are designing your packaging and your packaging should be ready to bear all the bear and tear through the transportation network when we are transporting that product it should be ready so maybe we are checking the strength of that packaging how strong that package is so that if that bear and tear happens during the transportation right. So, whether our product will be safer in that or not. So, that means you might be having some specification related to the strength of that ok. So, same way we are defining the strength of we are defining the parameters in terms of that we can say we are defining the parameters.

And in whenever we are defining parameters, we are defining a proper range up to what they can means go left or right and still they are within control. We will consider it that they are within control. So, that range we are defining. So, conformance to specification you are meeting the predefined specification that means you are meeting the quality standards. then at what cost you are meeting those quality standards will define your cost function and obviously, will affect your price and obviously, will affect your profit and margins as well.

Now, if we look on the other way, the consumer perspective to whom you are making the end delivery. So, they are obviously, they are not worried about the specification. Whatever specification you are taking, whatever strength you are checking of the box, whatever quality parameters testing you are doing with your final product. When it is reaching at my home, I will just check whether the packet is ok or not, whether the product is functioning or not, whether the safety parameters are ok or not. So, that means whatever quality characteristics you are promising in the market, I will check for those quality characteristics, I will check the functionality, I will not go for what parameter you have designed.

behind the window whatever is happening may be your if you are talking about home appliances so what capacity you are picking for picking the electronic components or how you are improving whether it is 3 star ac 4 star 5 star whatever it is aluminum binding copper binding i have nothing to do with that only thing is if you are saying that it is 5 star rating and will help you to reduce your electricity bill and will ensure the you know with inverter technology will ensure the proper cooling that is the promise from your side to a means very common customer and i will be looking for that so once it is plugged so I should be easily in the condition to play that right so fitness for use this is how we can define the quality for these two different stakeholders in that distribution network one is who is providing the products or services other one is who is receiving the products and services meaning for quality meaning of quality for these two different stakeholders are different in that way now when we are ensuring the quality there are two things two types of cost right one is cost of conformance and then is non-conformance let's say if you are saying that your product is a quality product or you are saying that your delivery let's say we specific in logistics the delivery is always on time and you are getting always the right product or the address is always right. So, packaging is always up to the mark. So, these are the the promises now quality means that i am getting all these promises so to ensure this that product is reaching in right quantity right quality or variety or whatever color you picked whatever stuff is inside that if i am receiving that that means you are conforming to those standards so for ensuring that obviously i will be

doing all the quality checks When I am doing all the quality checks, obviously there will be one team who will be doing that, there will be some equipments we are using to ensure the quality, there will be some facilities we are using to sort the products, we are using to pack the product and labeling those product, write addresses on those products so that it should reach to right customer, all this will carry the cost. This is your cost of conformance providing the right product. We are doing so many supporting activities so that the right product delivery can be ensured in that way.

This is the direct cost. the indirect cost is quality training when i am saying that one team is working who is taking care of the packaging one team is working who is taking care in the warehouse handling one team is totally dedicated on transportation network designing and then routing and then delivery and then everything right whatever functions are in logistics management so to ensure the quality throughout the channel we need to train our people it's not that that distribution is just anyone can enter into this and can do that duty right we discussed about that we need skilled people in the transportation logistics industry who can pack the product in the right way and who are professional in packaging right so that training will also add some cost in that We are doing some studies, some surveys whether the quality is met or not that will also add cost into this. This is cost to the quality. So, we usually say quality is free. this is very important statement quality is free but when you check this the quality is not free we will prove this how this is free so there is cost or ensuring the quality you are doing a regular checkup your team is working on that equipments are working on that right and then you are ensuring the quality you are doing surveys studies to find out is there any problem sampling based you are picking the products and then finding out okay the package is delivered on time in right condition to the right customer address was right all those things you are doing right this is carrying certain cost so this is the cost of the quality then cost of non-conformance let's say if we are not doing that randomly we are picking so what will happen we'll do the wrong delivery we'll ship the wrong product will ship obviously product and then quality will be in problem so you might have seen certain ads or something maybe in the social media that you are ordering phone through your e-commerce website and then in the end you got something else maybe bathing soap or maybe some other salt packet or something like that right this usually sometimes this happens so that means so many things can happen when you are not meeting all those standards so one thing is order will be coming back rejected another thing is if that product is wrong so that will be a kind of scrap for you and sometimes items are so if you will again pick those items those are kind of may be fragile items if you will pick those items again will you know come with your distribution center that you may break those items sometimes so you are leaving with the customer only and even you are giving them refund if it is damaged during shipment then you have to do the rework you under warranty period your engineer will be visiting the site and then will replace the

components free of cost so you just see this is the indirect cost that is coming to your company if you are not shipping your product in a right way.

So, if I will equate this cost with this cost, so if you are ensuring the quality, this all will not happen. Nothing is coming back from the customer. so whatever you are delivering the right product damaged product i told you the share is around 25 to 30 percent because we are damaging when we are delivering the product so that is direct cost to the customer and that is one direct cost indirect cost is my brand image is also hampered now customer will never prefer my website or i told you one survey we are 80 or 85 percent customers who had any prior bad experience with e-commerce player related to anything delivery payment or anything they then you know try to avoid going for those e-commerce websites and they want to you know they actually prefer than going physically and check the product so these are the cost when we are saying so in the end if you create that if we are ensuring the quality and maintaining that brand image we can say that quality is free right you can overcome these costs so let us take very simple example and we will see why these you know surveys or research are required to identify the faults and then what we will do with when we will identify the faults let us say very simple example there is some there are so many stages one is your packaging packaging is happening at one stage let us say in three shifts 3 different people are working let us keep it very simple 3 people different people are working right shift a b c now I can see I am analyzing that usually there are some faults or errors when we are doing the packaging what can be errors when we are doing the packaging may be you did not that packaging is damaged and you did not check it and you packed still you packed in that then you packed the wrong product then what can be there you forgot to put the accessories in that let us say you are packing the mobile and charger is missing or sometimes you did not put the manual instructions right instruction manual inside that packaging so these are some of the common mistakes errors you can do when you are doing the packaging there can be so many others right so now three different people are working now many complaints are coming from the markets let's say that there are issues with the packaging so i need to find out first issue with the packaging what type of issues let's say this is one two three four these four things are there let's say i'll just analyze first problem how many time it is occurring 15 times second problem 20 times third problem 10 times fourth problem 5 times so now i can find out that the second problem is the highest right highest frequency 20 times and what is that problem wrong product packed so the person whosoever is working on that he is packing the wrong product right so now i identified the problem and then obviously next important problem is once we will solve that problem the next is packaging damaged why packaging is damaged now for these kind of problems obviously the person who is working on that is responsible he did not check the packaging or and obviously the person the vendor who is providing you the packaging material as well is responsible but the first stage here is the packaging the person who is working on that stage now i need to

identify whether this problem is the first person second person or third person where are the maximum counts coming the complaints are coming who was the person operator sitting on that stage and was handling these activities right So, I identified the shift operator who is doing that. I identified the problems I identify I now prioritized all the problems and I found that second problem is the most prioritized we need to take the quick action. So, let us now find out problem is diagnosed now we need to find out the solution.

So, now let us move towards the solution shift operator who is the shift operator let us say the problem is with the second person and we are getting the maximum complaints the with the products which are tagged during his period right now what is the problem with the person so maybe now there can be so many problems whether the he is not happy with the job he is not happy with the company management He is not happy with the compensation in terms of the salary he is getting, in terms of the medical things he is getting, in terms of the other hospitalities whatever he is getting. Maybe he is not finding his passion in that job. Maybe his skills are not aligned in that job. These can be the reasons. So many other reasons.

Maybe he is disturbed. Why he is disturbed? Again, maybe personal life he is disturbed, maybe professional life he is disturbed. right why professional life again we need to ask these questions so that we can find out the root cause this is the another step where we will find out why that wrong product is being shipped because the person is disturbed professionally let us say person is disturbed professionally because he is not finding passion in that job or his skills are not aligned that means He was capable of doing something maybe something else, but we deployed that manpower on that workstation. Where is the problem? Problem is with the placement of that person. Who is doing the placement? HR team is conducting the interviews and in the interview only when they are going for selection there only they need to identify the placement as well that this person is capable of quality this person in the quality department this person is capable of doing the production kind of things this person is capable of doing the r&d kind of things or this is capable of marketing the product or what kind of things he can do right.

So, you can just see with one problem how we can first we need to diagnose the problem, what are the reasons, we need to find out, we need to prioritize the reason, we need to go to the root cause. So, this these all tools somehow are interlinked and then we can diagnose a particular situation and we can find out the solution so we will go through these tools one by one so just see how through automation they have improved their key performance indicators so this is a little longer video but it is worth watching will give you the complete picture of the performance indicators you guys can just quickly go

through these videos and then we will continue our discussion on the topic so yes so you can just see this is not a small thing that 40000 items 40000 items per hour they are handling through their automated machines and then if you see 11000 plus facilities they are injecting with their packages right so how beautifully DHL is doing that using automation if you talk about the indicators performance indicators you can just imagine how how much they are spending on one order if they are handling forty thousand orders packages in one hour right so then if you are talking about at that level so obviously you cannot say that errors can happen at any time so there cannot be any excuse so whether it is completely automated plant or you are doing with your human intervention whatever it is right but in the end you cannot just be efficient just by promising your quality right so these are some of the tools down the line we will discuss plan and do check act right so 7qc tools quality circle 5s approach how it will help us to improve that and then benchmarking going to the very first is So, this was obviously, four step this is known as wheel also plan do check at wheel. So, how we will do that? We will first plan, then we will implement it, then we will check the results and then will act accordingly if it is ok results are ok we will standardize those things and if it is not ok again we will go for the next phase planning and then we will do the modifications depending upon the feedback and then again we will implement this circle will keep on going until that problem specific problem is resolved. Then we will go for the next problem and we will again we will go with this wheel was this approach was given by Dr. William Edwards Deming.

So, obviously, the main Walter Shewart is known as quality guru as well and his contribution in that his pioneer in that field right so even w Edwards deming as well so in japan i think there is there are prices against their name deming prize for quality so this is how those people are known in that industry so Very first is plan. In the plan phase, you need to define the objective. So, what is the objective? I told you first you need to identify the problem. What is the problem right now? Let us say we discussed in the example that it is problem is related to packaging. right so how we can improve the packaging if that is not fault of the packaging and is the fault of the person who is actually working on that stage then we need to change the plan right so we need to work with that person if he is not happy with that work or if he is not happy with the compensation policy or the all those things we discussed right then we need to give him we need to address his grievances right and then again we will implement those things whatever suggestions are there and then we will again check whether the performance has improved in terms of the number of complaints have reduced or not right so that is the first stage we need to define the objective then this is if we will divide this process into three sub steps we need to identify the improvement opportunity where we will plan that again there are so many opportunities for the improvement which opportunity we will pick first like i told you the highest occurring problem was twenty times right which was we were shipping the wrong product So, there is the greatest opportunity we should

explore it first because then we can reduce the highest number of complaints coming from the markets right.

Then we need to set the measurable targets. Now, implementing that, what is the target? Next 1 month, it should be 20, it should be reduced to 12 or 10. Then again 2 months, review will be doing 5. Then again may be 6 months, we will see the consistency is there or not. The way now the new person or the same person after that handling the grievances how he is doing that.

Then we need to prepare the action plan as per that we will prepare that whether we will sustain this plan. for other workers also may be others are also not happy right now may be not creating the problem and may be in future that can happen or we need to change if we need to change we need to come up with the new policy right so that we need to take care so this is the first stage where we will plan then second is do now once we have planned we need to test that plan so you need to test the plan right whether how you can test that you need to actually perform as per that action so in very simple way if I will try to you know conclude this let us say I am having some process this is the process we are doing right this process is having certain output now this output I need to compare with some standards which we have already set up in that. So, I will compare with this actual output with the standards, whatever standards we have set. Now, we will see is there any deviation in the actual output from the standard? If the answer is no, we will continue with the process. and this positive feedback is provided.

If the answer is yes, there is deviation, we need to take the corrective action. not only corrective action we need to take the kappa corrective action as well as the preventive action corrective action immediately either we need to change the process or we need to change the raw material being supplied or we need to change the technology whatever it is taking we need to change that thing as per the Preventive action is that in future that should not happen, we should make some policy. So, this is the complete cycle, how we are controlling the output, how we are comparing this output with the fixed standard. So, you will implement that, then you will check. So, if goal has been met, then that cycle will be over, we will take the next problem.

if it is not met again we need to change we will take that feedback we will take the corrective action and then either we will change the raw material or we will change the process or we will change the technology right act so in the end if it is your goal is met we need to accordingly in future as well so that means we need to sustain that procedure for the other employees as well because they may be feeling in the same way so this is

the first tool plan do check act which we can implement and we can use to ensure the quality through your logistics distribution network right so how does this plan do check act will enhance the logistics quality so quality cost are associated with obtaining the required quality right so they relate for instance the deployment of an industrial preventive maintenance right we talked about quality cost right all the appraisal cost are quality cost whatever we are testing we are doing or manpower training we are doing equipment we are using facility we are using that those all those things are adding to the quality cost and then known quality cost if you are not meeting those standards and you are making the fault delivery again and again then you can just imagine your situation in the market because then customer will not be interested placing order on your website right so and if it is related to some financial transaction so obviously we will think hundred times before placing the order So, this is all about the plan, do, check, act cycle. In the next session, we will continue our other quality tools which can be used to improve the logistics quality. So, we will continue with the 7 QC tools. So, that is all for this session. Thank you very much.