Logistics & Supply Chain Management

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Lecture 16 : Lean Logistics (Contd..)

hello dear friends welcome back to NPTEL online course on logistics and supply chain management. So, in the last session we started discussion on lean logistics, we will continue our discussion on the same topic lean logistics which is very very important part because in order to be efficient throughout your distribution network you need to remove identify and remove the waste or waste in terms of if you are doing some unnecessary activities which are not going to add any value. So, then you need to identify those activities and you need to remove those activities. So, we discussed about the various concepts under lean logistics.

and how it started and we discussed about very important concept under that we defined muda, different types of waste, unevenness, overburden, how these situations are coming up in when we are talking about manufacturing or logistics services. We discussed about the principles of lean logistics and then we identified what are the key performance indicators, so that we can develop the overall performance matrix and we can track our performance with respect to those key performance indicators. So, we will continue from here today we will discuss what are the different methodologies framework we can use to implement lean logistics right. And then we will see what are the challenges in implementing lean logistics and we will discuss one very beautiful case study on Toyota production system.

So, just brief intro about what are the different aspects or methodologies framework we can use when we are talking about lean logistics. We will discuss in brief of some of the methodologies. So, first is value stream mapping, this process is actually you need to trace the a whole process you need to map the whole process what are the different activities you are doing in that process right. And then you need to identify all those activities which are not adding any value right. So, after identifying only you can eliminate the waste and inefficiency because of those activities first thing is you are consuming extra time and then extra time means extra resources in terms of man power is also deployed there in terms of resources energy resources you are using to operate your machines to operate your work station in terms of equipment you are using for extra time

right so if we can reduce even 2 to 3 seconds also then this is So, in big picture this is going to add in a very positive way.

So, if you talk about automobile car industry. So, if the average time every car is coming out may be after 3 to 3.5 minutes. right so you just imagine if you are saving 2 to 3 seconds so may be after you are producing 100 cars then you will be having one extra car right so in that way because this is something car is taking that much time 3 to 4 minutes if you are talking about some other product small industry where continuously your products are coming out of the packaging after completing the packaging right. So, if you can save even microseconds through your process and then in the end you can increase your overall efficiency.

So, we will discuss what are the different steps when we are talking about value stream mapping in detail. Second tool we can use is just in time. and because we identified inventory as one of type of waste right when we identified seven different types of waste. So, inventory was also one of the waste right. So, if you are keeping no doubt you have to maintain some minimum stock.

So, that you should not be stock out in the market right, but then excess inventory is also a kind of waste because in inventory when you are storing it you are not adding any value in that. and moreover you are consuming the resources on that if you are storing for handling for maintaining that inventory and then handling also you are damaging sometimes so that is extra cost. So, how we can ensure we will see what are the different steps under just in time we can implement that and whenever you product is required it can be shipped directly from your raw material suppliers to the production line and then from production to the customer. then standardized work procedures so another thing whenever we are coming up in manufacturing industry whenever we are setting new production line for new model right so then initially we are producing more process rejection right because the process is not standardized streamlined right and people who are working on that production line they are also not trained even equipment even sometime what is happening the raw material we are using the we later on after may be initial run of that production assembly line we will realize that we need to change the design we need to change some parameters and then we will come with the new one right. So, because before standardization so everything these kind of rejections these kind of delays inefficiencies are happening so productivity is in big question mark right so because we cannot be productive because we have not achieved the standardization so our target is always when we are coming with the new production line is to you know standardize the production line.

So, if we will standardize we will eliminate the variability because now everything is standardized. So, process variability will be very less right. So, we can reduce errors we can improve the efficiency as well. continuous improvement culture this is another kind of thing we will see kaizen steps how we can implement those kaizen steps so that continuous improvement can be ensured. It is not only one time you identified some reasons for rejection and then next time the process will be completely error free right.

So, every day there is new opportunity if not with the you can even improve the product design after may be 2 years 3 years. So, that is why so many product recalls are happening right. So, you might have seen we discussed about Volkswagen, we discussed about Maruti's desire and Baleno and then BMW even sometimes and then you talked about if you see Nokia they have to recall their mobile phone because of the issues happening with the battery right. So, over the time when actually after commercialization customers start using the product in that way very in your rough way right. So, even rough way even if you are handling with care even then you will start observing new issues are coming.

So, then maybe you need to change the raw material, maybe you need to change the design of the product, maybe you need to change the technology sometimes for manufacturing that product, maybe you need to train your manpower more. So, that means, every stakeholder, every unit element has equal role in improvement right. So, that continuous improvement will be there right. supplier collaboration when we are talking about just in time kind of system when we are talking about total quality management throughout the distribution network supplier is going to play important role right so that will only happen you will you need to share the demand forecast you need to share the production schedules because your down the line the your team is always interacting with the customer they are analyzing how the demand pattern is going to be right so as a manufacturer if you are keeping that information with you only or if your distribution network is keeping that information with them only there is no use so how without any delay without any you know manipulation in that information how we can pass the exact information from the customer we are receiving in terms of feedback in terms of quality complaints in terms of demand if they are having new demand patterns new buying behavior patterns so that should be shared immediately throughout the network. So, that will only happen when you have strong collaboration with your supplier.

Then another very important methodology is DMAIC for implementing lean six sigma methodology, where we will focus on eliminating the errors rejection. So, how six sigma

actually points out only 3.4 defects are allowed per million opportunity. you need to implement six sigma. If you want to implement six sigma then this is the methodology DMAIC we can use to implement that and six sigma means you are tremendously you are reducing the process rejection or defects in your product whatever you are producing you should not produce the defected product.

So, how we can implement the six sigma methodology to you know reduce that process rejection. So, process rejection let me clarify, see there are two types of rejection, one is your zero hour rejection, another one is your process rejection. So, your zero hour rejection is the responsibility is from the raw material suppliers. This is the problem with the raw material suppliers without you did not use that material on the production line and then you suddenly realize that there is something wrong with that material that is zero hour rejection. There is no issue with your manufacturing unit, but when we talk about process rejection this is something while converting those raw material into finished one.

we may break those components right so that means that is the responsibility of the manufacturing unit that breakage can happen because of the faulty technology you are using because of the faulty method you are using maybe the person who is sitting on that workstation is not trained fully so then you will be generating more process rejection and because this is the responsibility of the manufacturer so will reduce your productivity and will increase your cost because now if you say two items are you are using two components. for that particular product two components of one may be raw material. So, if you are damaging may be after see if you have 100 components. So, 50 final products should come out of that right, but if you are damaging those products may be 10 you damaged. So, then you will be producing only 45 finished products right.

So, that is the process rejection we calculate this process rejection as fall of rejection rate and we try to reduce it to less than 2 percent in some organization may be less than 0.5 percent 1 percent. So, anywhere if you are lying to between 2 to 3 percent that means, fair enough, but that depends upon your industry to industry, but now we are into the era of advanced technology where why even 2 to 3 percent process rejection we are allowing that means, every 100 AC we are manufacturing 2 to 3 will be defected right. So, you just imagine if those defected ACs are shipped to the market. how the product image will be done in the market about your brand right the experience customer will carry the experience customer will share with the other you know customers right so that means while your brand image in the long run so you need to be careful with this process rejection So, technology integration is another tool which we can use to you know

eliminate the waste and implement lean logistics and how we can we have seen that in logistics when you are talking about transportation.

So, in transportation how route optimization you can do, how you can reduce the distance, how you can pick the better route as per the environmental condition considering the accidents on the road, considering the road condition, considering the traffic jams and then your software is giving you the instruction that you can take the other route it will be faster than the this route right. So, if you can reduce that during your transportation again cost will come down because you will consume less your fuel that is one way you can use the transportation management software. The other thing is warehouse management we talked about how within warehouse you can fully utilize the capacity. if some part of warehouse is lying vacant all the time you can collaborate for you can go for consolidation horizontal integration where you can may be your competitors product also you can store in your cold storage house if that is the requirement right. how you can ensure by implementing those software warehouse management software you can ensure the proper stock rotation if you are ensuring that then no inventory will go outdated or expired right so you can in that way ensure the complete utilization of the inventory as well so these kind of software then handling and all that you can maintain quickly because it is a big large your warehouse facility how quickly and easily you can identify the item and then ship that item with your courier partner.

So, that on time delivery can happen with the end customer. So, these are some of the software we can use and during distribution network also you can see how you can consolidate more. you know final products or shipments so that instead of making 10 different deliveries can you manage with the two shipments so all those 10 deliveries in that particular pin code or reason right so that these kind of software will help you to minimize the your waste and obviously the performance will be improved sustainable packaging practices so obviously we should target to recyclable and biodegradable packaging which should have a minimum impact on the environment even whatever packaging you decided the material then you know what is going to be the footprint whether it is recyclable how you are going to recollect and all that but there are some other parameters which you need to take care when you are going for you know deciding the packaging right size of packaging. So, we have seen that video when your the container is carrying the boxes like this. So, all size of the boxes are not equal and inside that box the product is carrying only this much space.

So, this much is only packaging or may be extra packaging you are adding for just safety measures so how we can reduce if the product is only up to this how we can reduce

this extra layer of packaging right so right size of packaging will help you to reduce the to help to utilize the complete you know container space right and in that way you can be more efficient. Route optimization already we talked about you need to see distance, traffic condition, delivery time, what are the requirement from the customer and if you can minimize the distance and travel obviously, the fuel consumption will be less, vehicle wear and tear will be less. So, overall transportation metric performance metric you can improve. So, another your technology based solution where you can go you know performance based contracts when you are going for contracting your logistics things. So, you can go for your smart contracts kind of concept or you can evaluate your vendors continuously.

Whether they are your logistic partner, courier partner are doing on time delivery, whether orders are delivered accurately, inventory accuracy, how much inventory on record you have and physically if we will verify, so what is the gap in that. So, if you have completely automated kind of warehouse system, so there will be absolutely no gap. So, that we can in that way we can optimize the operation and we can minimize the cost. demand forecast and planning so if you are accurately predicting the demand using whatever predictive analytics you are using using software interacting with the customers or your sales team interacting with the customer so then you can go for inventory management and you can ensure that over production is also not happening and also you are not out of stock in the market so whenever customer is coming to your retail shop or your website you are always in the position to deliver the product right so this you can predict the demand accurately by taking historical data market trends and customer feedback but sometimes because these are kind of historical data you are using and you can exploit the trend and you can predict the future but sometimes some emergency situations may happen so because of that sometimes demand may come down sometime demand may rise up so if you take very relevant case of Covid-19 you might have seen the all the production houses they face challenges related to demand because in automobile sector as well right so our production reduced we shut down the operation and all the but if you talk about the medical supplies if you talk about even the common man started using mask, gloves, face shields, goggles and all those things and hand sanitizer right so earlier how frequently we were using now almost four five years now again you see the condition how frequently we are using the hand sanitizer gloves and all those things right so this this was opportunity for those companies but yes was major setback for major part of the economy right we can come with the modular transportation solution where we can standardize the container size by considering the packet size we should also fix the product packaging size. So, that the 100 percent container size capacity can be utilized and we should go for intermodal kind of transportation.

So, that the overall cost can be minimized and in that way we can be more sustainable wherever we have the infrastructure we should go through ships right. or we can go for last mile delivery we can use the cycles or may be we can use the electrical vehicles. Reverse logistics optimization we had complete session on this reverse logistics and then we saw that how important this is that if the product is coming unused product is coming or product is coming back because of warranty failures or product is coming back at the end of life. So, how your reverse supply chain should be equally efficient as we are talking about the forward supply chain. So, how you can efficiently ensure the resale of the product if it is unused, how you can ensure efficient effective recycling refurbishment.

So, all those things will help you to map your performance matrices related to reverse logistics optimization. performance measurement and monitoring this is important that whatever kpis we are recording we need to maintain track those kpis throughout our distribution network so only then we can identify where are the bottlenecks right where we are lacking and like kaizen i talked about so everyday small steps improvement will happen only when we will identify where the improvement required at the most where we are lacking at the most where we are lacking where we are losing our business right so how we can be more cost efficient so some there may be hundred opportunities but if you will address out of those hundred may be first ten you will prioritize may be you can address sixty seventy percent of the problem of efficiency right so that we need to find out So, this is the first process value stream mapping. We discussed about how we can identify inefficiencies and bottlenecks. So, you need to identify what are the value adding activities and what are the non value adding activities. non value adding activities are also known as supporting activities.

and in the end the customer is getting one package of product where for delivering that product you are doing non-value adding activities as well you are doing value adding activities as well. Now, value adding activities let us say your logistics is value adding activities. giving the customer best experience by delivering the on doorstep delivery then your manufacturing who is putting all those feature into that then your sales team who is going to address your needs record your needs and then provide you product as per your requirement right so then maybe if you are talking about r & d if they are coming with the new features renovating their product every time these are some of the kind of activities we are from these activities as a customer you can continuously you can drive the value out of that but non value adding activity let's say if you are talking about human resource management so human resource management primarily function is to maintain the human resources within the organization and then you are doing you are designing your compensation policies you are designing your health care benefits you are designing all other things are related to your complete package you are giving to your employees now

as a customer whether you are compensating your employees up to the industry level or you are below that average or you are above that average as a customer if as long as my product is ok doing well I need not to bother about that so this is kind of but this is required I am not saying that HRM practices are not required they are doing training and development programs just to you know keep their manpower resources updated but as a customer i cannot drive direct value out of that but it is very much required to retain your employees within the organization right so these kind of like if you are doing auditing kind of services as a customer whether your inventory is matching with your physical inventory or not how i should bother if i'm buying car it should have five tyres i'm getting five tyres whether your inventory lost some tyres damage some tires hardly bother about that as customer right so you need to identify what are value adding activities what are non-value adding activities and how then you can take steps step wise to reduce those non-value adding activities. So, this is very by W Edwards Deming one of the quality guru. So, pioneers in that field he said that if you do not describe what you are doing as a process that means you do not know what you are doing.

so if your process whatever you are doing is not related with the end result so that is something kind of waste so that is known value adding activity so how we can eliminate that waste is value stream mapping this process we will see five steps so simple example you can see earlier the motion of the product is moving like this zigzag motions you just see how it is moving from here to there and then again to zigzag motion is there So, we identified that extra motion means extra handling means breakage of the product means extra cost means inefficiency. So, all these things are related. So, how we can reduce it with implementing lean basics and there will be the smooth and a stream line flow. So, that zigzag flow should not be there. So, how we can do that? We need to prepare the problem.

What is the problem? We need to identify the current state by analyzing the current data and then we need to develop the future state where we want to be and then we will as per that future state we will develop the plan and we will try to implement that plan and we will then in the end we will again track that plan whether we implemented in the same way or we will align that plan with the overall activity so we will see step by step first you will prepare you will document the change right whatever you want to change you will define the scope either it is related to process or you need to change with the manpower or you need to change with technology or you need to change something else in order to be more efficient right so you need to identify the scope and then identify the requirements if you need to change the manpower so why that requirement is there that means manpower is not trained fully so you cannot hire and fire just like that so what you can do you can arrange the training and development programs for those people who are working on those critical stages so this is how it will happen so then you need to set

logistics for event you need participants stakeholders if you are talking about process the process stakeholders will be there location where you are going to implement materials refreshment means everything is required to you know this is a kind of workshop you are going to conduct initial basis and then you will analyze the result of that then you need to gather data let us say right now the problem you identified related to on time delivery now this on time delivery is not happening because the courier partner did not pick the product on time so that means now I need not to focus just on the distribution partner I need to focus on first on the that partner who was taking the product from the seller that courier partner and shipping to the local warehouse right and then from there it is going to customer right. So, this problem is with the this courier partner he did not pick on time. So, then the problem came from there only. So, even if this courier partner is on time, but because the initial delay happened so that will giving you will be giving you ripple effect right. So, it will be you know effect it will affect your the whole process so you need to identify if you are talking about actual lead time what is the lead time output related issues are there cycle time you are not able to complete on time so whether you need to rethink about the cycle time or you need to reduce the unnecessary activities then defect rate quality related issues are there so that means you need to identify that thing and you need to collect the data if I am saying that map the flow of item and delivery on time delivery was one big question so we mapped this flow of item so product started the journey from the seller actually started the journey from the raw material supply and then courier partner then again shipping agent is there then local warehouse distribution partner will be there who will be giving the final product so we need to find out the flow of the information and in that flow where the bottleneck is there right we need to identify that we need to then find out the future state future state and action plan now we identified that if we are saying 5 days it will take So, it will give you only 12 hours to the courier partner to pick the product from the seller right.

So, if it is taking more than 20 hours you need to identify that this is the target this is the gap. So, you need to identify this as future state that we need to target 12 hours that is maximum we can go for and then we will communicate this with the courier partner that you need to pick after recording the order within 12 hours you need to pick the product. and if it is not happening maybe you need to change the technology because you are not able to share information quickly so then you need to do and then maybe sometimes training is required so let's say we will explore this one worksheet the process or function let's say we are shipping the wrong product and why this happened reason problem maybe the person who was sitting on that recorded wrong order wrong order recorded right now action items what we will do why the wrong order recorded i as a zometo customer i place the order with the restaurant and maybe restaurant that information was not shared accurately and in the end when i communicated with my kitchen so i communicated wrong items right so now lack is because human intervention is there why

So, is it possible can we replace this if the order is directly coming to zometo can we share the exact information with the kitchen as through that network. So, that this wrong shipment of item will not happen. that this who is responsible for this the technology people r & d people who can develop this platform right due date how we can implement that and then we will we will record the matrices how we can improve those performances right and then in the end once we decided that this technology will be implemented so that we can ensure the delivery of the right product we need to execute the plan right and then once executed we need to align this and may be many reviews may be required with respect to what you have been doing earlier right and then implementation and results whether that really affecting your performance matrix or not that you need to record right so if the investment is this much right investment is this much and your result is this much you need to rethink about that because you contributed so much but the result is so maybe then you are addressing the wrong issue so then one you again you will review you will review in the with respect to the environmental changes right and then you will communicate the results whatever changes are required you will update those changes with the technical team and in the end you will ensure that wrong delivery should not happen a very simple example how we can implement this right so if you see i want to staple a paper And, the complete process is given here.

I will pick up the paper, 1 second I will take, walk to stapler 5 second I will take, staple 2 seconds, walk to desk again 5 seconds, put down the paper 1 second. So, total time if you will add is 6, 8, 13, 14. And, if you will see total distance you travelled is 40 feet. but value added time is only you picked up the paper you staple the paper and you put down the paper that is only 4 seconds. So, those 10 seconds are waste and value added distance no distance was required if your paper and pen your stapler is there only this is very simple example.

So, that distance also you can minimize. So, you can see how you can be productive value added time was only 28 percent. So, rest whatever you are doing was waste right. So, 72 percent of the things you are doing is waste right. So, we will continue this discussion with the some more methodologies how we can implement the lean logistics and obviously we will go for one case. So, this is the reference list from where the content has been prepared and you can refer these books for more understanding, better understanding of this.

So, that is all from this session. We will continue discussion on different methodologies in lean logistics while you will plan to implement lean logistics in your operational area and we will go for Toyota production system as case study. So, thank you very much.