Logistics & Supply Chain Management

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Lecture 37 : Strategic Sourcing

Hello dear students, welcome back to NPTEL online course on logistics and supply chain management. So, in the last session we decided that what are the things or the functional area we need to in house and what are the things we need to produce or outsource to some third party right. So, that decision we have made. So, throughout the complete value chain that supply chain what are the activities we have decided that we will go for outsourcing. So, once you have decided to go for outsourcing then there comes the concept of strategic sourcing because why we are calling strategic sourcing because it involves long term investment of the resources. So, you cannot change your vendors, your sources, your stakeholders overnight right.

So, and also if maybe one or two vendors are struggling with something quality, price, delivery. So, even then you do not want to delete those suppliers right from your list, because every supplier is equally important. Maybe you got cheaper vendors or suppliers quality wise also overseas right, but what if something goes wrong and that overseas supplies is interrupted then you need to depend on the local vendor. May be the cost you are saving by deploying the overseas vendors may be that you can save by deploying may be just in time with the local vendor right.

So, these are some of the pros and cons. So, that is why this is strategic sourcing. Once we have decided we will go for sourcing what are the key elements we need to decide for getting those strategic sourcing partners right we will talk about supplier selection now what are the different options available and we will evaluate those options we will maintain the relationship under supplier relationship management and then We will identify, we will categorize different suppliers as per their role, their importance. We will talk it in the supplier segmentation and then we will talk about the global sourcing as well some aspects of that and we will end this discussion with one case study. So, strategic sourcing is identification, evaluation and selection of suppliers.

Once you decided we will outsource the sub assembly part, transportation part or warehousing. Let us find out how many players are there in the market, we will identify, we will evaluate as per our criteria, whatever criteria we have set. It is not only we will focus on low cost supplier. It is the purpose very purpose here is strong relationship, improve quality, delivery performance, reduce cost and mitigate risk. Sometime you will get the cheaper supplier, but you are always struggling with getting the right quality.

Sometime maybe you are getting the cheap material, maybe fair quality that delivery person is or your raw material supplier is always struggling with the delivery. what if there is any uncertainty in the market, how you will share the risk of uncertainty with the raw material supplier, but raw material supplier he is saying that I will produce whatever you have ordered. Now, if you will ask me to change to some other pattern other design other material. So, you will pay for this whatever I have developed the infrastructure here, whatever the raw material machines I have acquired right. So, what are the factors? like product and process specifications what you are developing right, what are the available suppliers in the market and customer service to determine the feasibility of sourcing materials locally or globally.

We will talk about in detail in global sourcing right. when we will talk about the developing your vendors overseas right. So, this includes the development of sourcing strategy, negotiating contracts, establishing partner relationship. Now, negotiating contracts other than your delivery, quality, price those are there in your negotiation terms and conditions, but then if something goes wrong, if any dispute is there where you will handle, how you will handle. right that also you need to define.

If you have ah if you have accepted the vendor lot as per the quality quantity. in how many days you are going to make the payment that payment terms also you need to define in the negotiate terms how you will be making payments in installments or how you will be how you will be you know allocating orders you asked me as a vendor you asked me to you know develop this much infrastructure but now you are diverting your whole order to some other vendor right i am not getting those orders to even reach at minimum Q star you know quantity where I can be at the profittable position. So, that break even point I am not able to reach. So, that you need to ensure. So, some characteristics of strategic sourcing this is disciplined buying process, repetitive process it is not one time process.

So, may be in one month depending upon the product and depending upon the components you are supplying may be you are supplying 5 lots, 10 lots or may be 15 lots if that is high valued product because that much inventory I cannot keep. right depending upon size also depending upon the product features characteristics also it depends upon how many repetitive procurements or purchasing you are doing right total cost factor. So, total cost factor is not only the cost of the raw material it is the cost of acquiring the material right. So, that cost is if you are ensuring the quality, quality will also take some cost service delivery other than the delivery after sales services to maintain that relationship means total cost with one vendor if you have appointed one person to tack or tap five vendors to you know negotiate with them to you know track the orders to raise the purchase order. So, that person cost is also included in that right.

Consolidated purchasing power that again strategic sourcing when you are going for you can leverage on high volumes right, but then again if you are producing higher what actually is required so that means, you are creating inventory. So, that inventory cost holding cost is good enough to go for or you want to leverage on the high value that is trade off you will make right. tight supplier relationship it is up to you whether you are keeping your relationships or your vendors arms length away or you are keeping just shoulder length away how closely you are working with the having said that arms length away means that means your those strategic partners outsourcing partners are not your you know complete stakeholders of your value chain right. So, that relationship you need to define that depends also what type of product you are buying whether very close relationship is required whether you need to set up you sometimes you are asking your vendors to set up their facilities near to your production house. So, that just in time can also be ensured, but whether that vendor is ready to set up he will be ready when you will ensure that we will feed you large orders and that break even point you can reach right where after that break even point you will start producing profit improved teamwork and purchasing skills So, now, teamwork means whenever you are going for negotiation, you are going for outsourcing, it is not only one person game that one person is developing the outsourcing partners.

All the person from different department logistics, operation, marketing, accounting, purchasing, store department. So, that all the possibilities you can record, all the terms condition can be included in and that negotiation ah legal document right. So, if only one person is representing all the functional units may be the person can miss that right. So, this is teamwork realigning business processes. Now, you need to realign or reevaluate your business processes right and your business processes with your strategic sourcing partners.

right. If you have aligned properly, quick information sharing is there, transfer transparent information sharing is there. That means, that placing order, waiting for the order, then tracking the order, then you know always you are after the vendor, where is the raw material, where is the lot. So, then that cost can be minimized, cycle time can be reduced, inventory cost can be reduced. Whenever you are requiring the material, your raw material supplier is feeding you that material, why you will maintain the inventory? Continuous improvement will be there when you will be setting up the key performance indicators for your vendors, for yourself as well. So, I have seen some of the manufacturers like if I have worked with the Average India Limited, I have worked with the Philips manufacturing co-makers as well.

So, basic point I will tell you here continuous improvement. What Philips is doing? They are asking all the vendors to generate the quality report of all the components they are supplying right. So, that means, whenever I will receive any lot they will send me the quality report of that lot. quality report means all the checks will be there in the next session we'll talk about the vendor rating where we'll see what are the different parameters all the dimensions you want to check you want to check aesthetically the position of the product right. So, those already you have given vendors the checklist that whenever you are sending lot based on certain sampling you need to ensure that right this is what Philips is doing.

And when the product lot is reaching to the manufacturing unit again their incoming quality control is checking the product. Again it is checked in the process, again it is checked when the final product is ready in the outgoing quality control department. So, this is how not only the manufacturing unit you are focusing to improve the quality, you are focusing to improve through your vendors also who are providing the raw material right. Focus on value creation this very basic example I quoted how you can create a value by ensuring the quality at different stages and will help you to you know develop the loyal customers and will satisfy customer right. Next is supplier selection and management.

Now, you have identified all the potential alternatives available in terms of number of vendors and suppliers. Now, you will go for selection and then we will talk about supplier relationship management. So, you will talk about importance of supplier depending upon. there may be some factors like unit cost right, reducing the total cost of acquisition, meeting customer requirement, relying on few suppliers and depending on supplier for designing. Importance of supplier we can find out, we can categorize as per the component he is supplying.

There are two ways how you can find out, one is quantity, another one is your quality. So, depending upon the quality of the product sometimes the product quality fair quality will also work right because that component is not very very important in that functioning of the product right. So, that if let us say you are manufacturing AC. So, in inside AC whatever binding you are using whatever machine you are using very very important right cooling unit you are using very very important. PCB you are inserting inside to control the programming of the AC is very very important.

Remote you are using is very very important, but what about the outer casing plastic casing you are using. So, even if you are somewhere compromising with the quality because once it is hanged. So, as long as you are not touching you are not dropping. So, that much hardness or quality is not required. So, there may be you can so, then you can based on quality you can distinguish.

Based on quantity how much you are buying from that particular vendor we will see in vendor segmentation in detail right. Supplier relationship already I talked about whether you are keeping at arms length or you are keeping at very near to you that depends upon you. Supplier selection criteria. So, now, quality, delivery, performance history, warranties, claim policies, production facility, capacity, their potential, their technical potential, their human skills right, their scale up scale down capabilities, their financial position, industrial relations, how they are dealing with other vendors, so many things you can record once when you are going for supplier selection. Once supplier is selected, some of the parameters are obsolete, history is gone, how he is dealing with other vendor is gone, their financial position may be may not be very important, then you will keep track of what quality he is delivering.

Once it is selected, quality is giving, price is giving, delivery performance, these three are the major, there are certain parameters, but these three will take the maximum share. As long as your vendor is doing fairly well on these three you will still you can carry with that cost. Supplier evaluation, so continuous evaluation will be there that is one thing when you are receiving the lots you are providing the evaluation feedback right how the lot is doing right. So, but the another very basic point it is not only to you know select or reject the lot of the vendor. To improve the quality of the raw material you are getting from the vendor is also your shared responsibility right.

So, if vendor is not doing well with certain parameters you need to develop those vendor for those parameters right. So, that is also your define will how closely you are working with your vendors your relationship. Supplier certification let us say my manufacturing unit says that we are always environmental conscious, we are always quality conscious three main features. environmental conscious we are quality top class quality we are providing to our customers and work hygiene work safety hygiene parameters our employees these three are major concern and i am as a vendor approaching to you i am saying sir we are iso 9001 certified that is for quality we are ISO 14001 certified we are 45001 certified. So, that means, if you are ISO certified that is fair enough for me because you are maintaining all the records you are taking care of all those measures very easy for me to make the decision.

then supplier management once it is done how you will manage the supplier how you will help them to improve the performance to monitor the performance and if any issues are there let's say if they will upgrade their technology there will be improvement but upgrading the technology they don't have those financial you know resources so how you can help them benefits of strategic sourcing already we talked about if you have those close relationship strategic sourcing how you it can impact your business performance. Now, we will talk about supplier relationship management. Once suppliers now vendor selection is done for one component we have now decided that we will go for vendor 1, vendor 2, vendor 3, vendor 4, 4 vendors we are maintaining for this particular component right. Now, how will manage the relationship with these 4 vendors and it is also there that all 4 vendors are not giving you equal quality, equal price, equal delivery, time schedule right, equal contract terms, different contract terms will be there. Some may be provide giving you just in time, some may be asking you to hold the inventory depending upon overseas vendor.

some are very good with the quality. So, how you will collaborate that collaboration will decide the mutual beneficial relationship both for both right. So, that will only happen if you have trust open communication and it is not only as a manufacturer I am maximizing my profit, I should ensure that my customer profit is also maximized right. And then if it is so, we can share the risk, we can mitigate the risk and we can have the access to the resources of the other organization like technology, like skills we can use that right. So, this involves supplier selection, contract negotiation, performance measurement, joint planning and risk management right. So, to establish supplier relationship management first is you need to define the supplier relationship management right.

Relationship management means that should align your strategy very basic example I will code here let us say as a manufacturer I want to take risk, but my supplier wants to play in a safe environment. So, what I am doing as risk taking player I am doing you know innovation and then coming with the new product new features. So, quickly asking my supplier to change the design of the raw material whether he is ready to do that because he wants to deal with those products items where this you know saturated kind of demand is there. So, I need to align the strategy key identify key suppliers out of those suppliers now who are going with our strategy or who are ready to change their strategy as per our strategy we need to pick those we need to identify those suppliers. Then we need to assess their capabilities now they are ready to change the design the change the process the change the quality parameters their dimensions whatever product or component they are providing.

We need to assess the capabilities may be you can ask their capacity, their turnover, their market expansion strategies, their manpower skills, their technical skills, how frequently they are renovating. So, those capabilities you need to analyze. Establish governance structure right. So, now, you need to define the roles responsibilities and decision making process right. Let us say the example we talked about when we were talking about you know that how we can handle the uncertainty and sometime what we were saying that as a retailer our retailer is absorbing the maximum uncertainty manufacturer and raw material suppliers are not handling the uncertainty.

So, they should be most efficient our retailer should be most responsive because he needs to meet all the orders. So, then margin should be higher with the retailer not with the manufacturer and suppliers. So, that governance you need to set the proper rules right, then supplier collaboration initiatives if supplier is lacking somewhere with the technology and he wants to you know come up with you and wants to develop that technology how you can help your supplier invest in technology let's say very small supplier cannot implement the supplier management software inventory management software we are talking about vendor managed inventory right warehousing softwares. So, but those softwares are very helpful we have analyzed, but that small vendor cannot analyze. So, how we can implement those softwares at the vendor end and will get the you know profit for both right.

Foster open communication already we discussed about transparent open communication will help them to develop the trust to develop that relationship right. Implement performance matrix. Now, KPIs we have we are tracking the performance of individual those 4 suppliers we finalized and for each lot we are finalized we are tracking the performance of the lot against those parameters. So, then we can provide the feedback and how they can see if I am manufacturing unit I am in charge of incoming quality control as I have worked as incoming quality control engineer with the average India limited. So, what we were doing we were inspecting lot coming from different vendors and certain sampling based right and if that lot is passed in the sampling we are passing the lot to the production or otherwise it is rejected complete lot rejected means will be shipped back to the vendor.

So, it is not only the responsibility of the IQC, there I have learned that. So, why do not our IQC team visit the vendor location and help them with setting up those parameters, help them maybe with changing the design, changing the equipment, changing the technology. Let them understand what are our requirements, why your lot is failing, because just failing rejecting the lot will not help either the manufacturing unit or the vendor. And then development programs this is what I was talking about why do not you conduct some ah vendor development programs.

So, I have seen like L and T, Havels, ABB. So, what they are doing for electrical they are coming with you know new new solutions for controlling the lighting system for controlling your electrical supply electrical equipment. So, what they are doing they have the close collaboration because they are not selling they are not having their own retail shop they are selling through different retailers. for all those major retailers time to time they are organizing seminars, where they are treating them very well and then they are educating them about the new products right. So, that means, once you know all the features of the new products only as a marketing or sale team you can convince your customer that these are the new product coming from Havels, these are the new products how you can control from one point you can control the electricity of your whole house. how you can install the smart electricity management system right so that that is the thing objective of supplier relationship management obviously if we will talk about first two three will contribute about seventy percent eighty twenty rule of Pareto principle so you need to cover twenty percent of the items eighty percent objectives can be completed leverage on supplier capability so Let us say Apple is very good with manufacturing, but not with the distribution, they are selling through online.

Let us collaborate with United Parcel Services and then sell your product throughout the world right. If you have developed that image, why do not you make it available for everyone, when everyone knows about your product. So, then you can leverage UPS, you can leverage DHL services right. Cost reduction target obviously, Apple is doing with the China, where they are reducing the cost. Now, they are outsourcing to India, where they are reducing the production cost.

Philips is not manufacturing their product, they are outsourcing to their manufacture co-manufacturer reducing the manufacturing cost. Security of supply. And then you can have multiple vendors, some nearby vendors, some overseas vendors. So, overseas vendors you can maintain quality and price, with nearby vendors you can ensure the smooth supply. If anything goes wrong with some party, the other can ensure the complete supply.

So, this will become the customer of choice, it is not that you are picking some vendor forcefully that also happens when we have some industries like if you are processing petrol or diesel crude oil is coming you have to buy only two three players are there. So, then we do not have so many options. So, many other objectives are there you can see we can have sustainable relationship, enhanced relationship, we can have access to global market, local market, we can expand our boundaries, price we can negotiate, we can be more effective those all are objective of supplier relationship management, but how? some are challenges which are posed when we are talking about supplier relationship management if you are too focused on cost only always you are talking about cost you are not talking about the delivery of the product you are not talking about the quality of the product you are not talking about the changing variety of the product innovation of the product so customer is now getting bored so quickly that your product life cycle which earlier was maybe for product for 5 years now it has reduced to only 2 years and there is study saying that almost 70 to 80 percent of the smart phone users they are changing their mobile phone every 2 3 years. Just imagine how much waste is one thing, but why they are changing because new features are coming and still you are saying that cost is very important.

So, that is one challenge. When you do not have alliance with the strategic partner like I quoted the example you are risk taking as manufacturer, but your supplier do not want to take risk. So, you have picked the wrong supplier. Strategic objectives again the same thing you want to be responsive, but your supplier want to be cost efficient. So, that alignment should be there, there is no open communication right. how you are negotiating, how you are developing the legal negotiating documents right.

So, how you are ensuring the win-win situation for your vendor as well that you will feed them large order, how Walmart is doing that, how strategically he has outsourced you know with the vendors that they are getting the minimum cost products and then selling those product throughout the world. So, largest retailer chain in the world it is not that easy to be right, how you know Alibaba became so big in China you just imagine taking 5 percent GDP of China. So, how how big they are you know becoming. So, then they are collaborating with the local partner as well they are collaborating with those foreign players supplier segmentation now this is important to segment your supplier which supplier is most important right so then you will understand how you can segment this see there is there are two things right one is quantity another is price another ways how you can do that maybe quantity you are using in millions right for maybe let us say quantity you are using 50000 items, but price is only let us say 5000, but other hand you are using only 200 pieces price is 50000. So, that means, these are two parameters how you can segment the suppliers from one supplier may be very important because huge quantity he is supplying, another supplier very important because he is not supplying huge quantity less quantity, but valuable parts right.

If we will talk about automobile industry engine is something very very important you know highly priced, so the value is there. But if you talk about many screws you are using, many machines part you are using, quantity is huge right, but the value is less. So, chronologic matrix is there to define our suppliers into four different categories. Strategic suppliers, these are those suppliers which are adding high value to your profit but risk is also very high with those suppliers right high supplier risk is there ,leverage suppliers they are helping you to get the high profit but supply risk is always very less so these are suppliers where you can leverage right profit is very high but supply is constant they are ensuring bottleneck suppliers low profit high supply you need to think about these because not adding much value to your profit but and then challenging right Non-critical suppliers, low profit, low supply risk, this is one way how you can categorize your suppliers right. so criteria for supplier segmentation how much you are spending on particular supplier if you are spending eighty percent of your budget on one or maybe two suppliers why don't you negotiate for higher price right why don't you go for lower cost right so if you are spending only twenty percent so then there is no point of you know negotiating on that risk how much your supplier is taking the risk if he is bearing more risk obviously you need to compensate the supplier.

Criticality of the component some components are like AC I told you not very critical related to safety related to functionality. So, then way that way you can still compromise with the quality ask him to reduce the price, but if it is the key component the binding copper winding you are using aluminum winding you are using inside the AC. The PCB you are using to control. So, then those are very critical. Performance you this is another based on performance, performance you can record on quality, performance you can record how quickly he is revising the prices, price performance and then delivery performance are three major things always I am talking about you are evaluating any supplier once supplier is fixed right.

majorly three things, but there are so many other things like industrial relations, negotiations, how you are settling the issues with that supplier. Market position of that supplier, whether that supplier is known for the industrial relations known for the delivery whatever he is delivering in the market. And geographic location very near can be very effective because will reduce the lead time, will help us to implement just in time, will help us to reduce the inventory, but if it is overseas vendor. will help us to increase the quality, will help us to reduce the price, but will not implement adjusted die, will not implement that inventory, zero inventory policies. There is another analysis of ABC analysis, how you can segregate based on quantity, how much value they are covering.

Small number of suppliers, but they are contributing majorly right. So, may be those suppliers only 10 to 20 percent and they are taking almost 70 percent of the value. Engines you are using, tyres you are using right. So, the chassis you are using right, the steel body you are using may be 20 percent of the suppliers carrying the 70 percent of the cost.

Then these are modulate suppliers these may be 30 percent suppliers. So, they are spending may be average spending right again may be 20 percent. Then large number of suppliers may be another rest 50 percent 40 to 50 percent of the suppliers, but only contributing 10 percent in the total volume. This I am talking about in terms of the price they are charging economic or may be you can also divide this in terms of quantity, but price is may be screw their. giving you screw, but cost is very less right.

So, but quantity is very high. So, that is depends upon your ABC analysis of inventory management you can utilize the same approach here as well 80-20 rule again we have implemented you can see that. Then we need to tailor the supplier relationship management strategies based on segmentation which is more important strategic supplier who are high profit high supply risk. That means, you need to develop that advantage competitive advantage with those suppliers right and you need to work with those suppliers because risk high supply risk. Leverage suppliers already we defined who are leverage to suppliers high profit low supply risk right. That means, there you should target about efficiency because supply is almost continuous when it is certain situation we talked about in setting the strategic fit that we should be efficient.

Bottleneck suppliers low profit high supply risk, profit is very less, but supply challenging right so how you can maintain the safety stock so then you need to go for that maintaining the inventory that will carry cost non critical supplier no profit no supply risk so there also you can implement efficient transaction management if you see all the products coming from maruti suzuki are not equally demanded So, then how what you will do with the low profit, but still the partner who are supplying may be if we will talk about Maruti Suzuki SX4 was not that much successful, but still partners are there who are supplying component for SX4. If you talk about Maruti Vitara bereja, Grand Vitara, Swift, Desire. So, highest unit they have sold or Alto how you can forget Alto or Maruti 800. at that time every other vehicle was a Maruti 800 right. So, that situation is also there let us talk about quickly global sourcing when we are talking about developing vendor overseas and you know why we are going overseas either we are getting enhanced features quality reduced price right.

So, then we are going for overseas vendors. So, we need to identify evaluate and again suppliers from different countries again Only thing is whether you can implement just in time with those or not, but you cannot completely shift to overseas vendors. First is cost obviously, one dimension or outsourcing means cost is first main criterion you will evaluate. Quality what quality level he is supplying Obviously, if you are going overseas one very basic purpose is you are getting access to latest technology. Latest technology means enhanced version, enhanced features, enhanced quality. Corporate social responsibility if you in that way you are very very sincere about that how your suppliers is ensuring risk will be higher.

Overseas, whenever political scenario will change, whenever any disaster will happen, any dispute, war like Russia, Ukraine is going on since last 2 years, right. Other countries are also participating, what, when will happen, you can never predict those. Challenges, risk are always there. Political disruptions, anything goes wrong, how the scenario will change, right. And then the infrastructure, local context also you will evaluate, right, with the overseas vendors.

So, this is very interesting case study of Colorado manufacturer. So, they are actually producing the machine products right. So, you can see machine products are high in quantity and required special operations when they are producing used in almost all the equipments you are using at home, at garage or may be in the vehicles also. So, they were manufacturing that. So, they experienced fluctuating fortunes until 1990, but then the product demand surged right, but this increase in demand led to the expansion obviously, company will expand size product offerings right, but when one company was growing in that other competitors were in attracted towards that. Colorado the main thing was they were building to order, once they were getting the order then they were start manufacturing right.

So, that means high lead time was one thing they were suffering a lot. and their market share erodes due to this shorter lead time and lower cost of the competitive products. Now, competitors they tapped this parameter that their lead time is very high, let us produce quickly and capture the market. So, this is how they started dropping their market share and again another reason was outdated material source planning system and you can see 1 million dollar excess inventory and went obsolete, huge cost huge cost is there right. Then average lead time which I was talking about was 12 week almost double than the competitors.

So, you can just imagine this era if you are saying 12 weeks you know lead time. So, there is you know just in time system where is minimizing the inventory all those things right. So, then overall scenario started changing their competitors started you know acquiring their position. So, then the new president join and he was expert in implementing lean manufacturing supply management practices and he developed one strategy for 3 to 5 years and the main purpose was how they can globally implement this system of implementing lean. How they can develop their this supply chain management you know a platform right and they can minimize the total cost and as well as lead time the main function here was lead time. And then they were lacking in house strategic sourcing if you are not producing in house So, that means, majorly you are depending outside, outside means lead time will be high your dependency on others.

So, then he prepared one cross functional team including all the different experts from all the team purchasing, marketing, sales, R & D, manufacturing, so that he can have the overall comprehensive view. So, they defined strategic objective obviously, reducing lead time and at least they want to reduce 80 percent 2 weeks should be there right because their competitors were producing delivering in 5 to 6 weeks. So, they wanted to reduce this they specified what are the critical parts. and those critical parts due to which the total supply is interrupted in the end market can be find some local players for that. If we will find local players for the critical parts, non critical parts we can invent inventories and we can maintain the inventory.

Then they assessed and select qualified suppliers only who can you know go for that agreement they can deliver quality quantity price. right and then supplier selection and part allocation was done they consolidated large number of supplier into smaller parts and they fed them large order but only thing was only promise they took from their vendors you need to reduce the lead time maintain the quality and minimize the price efficiency they awarded those players consolidated which i already talked about So, then they implement Kanban quantities. Now, they implemented Kanban production system with the vendors. That means, they designed bin depending upon the requirement of that particular component. They decided depending upon the forecasting, depending upon their manufacturing requirement, they place different types of bins right and then they ask their vendors to you know replenish those bins as per the required quantity.

So, Kanban quantities they went for, they tracked the results and made the adjustment if any required and quickly we can go through the results. Marvelous results decreased from 6 to 8 weeks to only 2 days lead time. And because you have reduced the lead time obviously, on time delivery rate increased from 50 percent to 95 percent you are now on time. And quality is also improved nearby vendors supplying quality with latest technology, price stability 30 percent, inventory dropped by 50 percent. Because earlier you were storing products for 6-7 weeks because it was taking 6-7 weeks to replace the inventory.

So, that much cash you were taking in hand. So, they implemented this lean concept and these are some of the you can see supplier on time delivery is 95 percent more than that this is how they achieved. So, this is a beautiful case study we have seen supplier relationship management how we can develop the suppliers and then we need to develop long term relationship nt at the arm length we need to keep them very near to us we need to segment all the suppliers group into different categories how they are producing how they are you know contributing towards the total profit the risk in the supply right. And then we talked about the global sourcing can be very important access to new suppliers and we talked about outsourcing how we can do outsourcing we can be more efficient and we can improve the overall quality of the value chain. So, these are the references you can go for further reading that is all. Thank you very much.