Supply Chain Analytics
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Lecture-30
Flexibility in Supply Chain

Welcome back friends, we were discussing in the last session about different types of uncertainties and how these uncertainties can impact the network design decision and in that uncertainty in the network design decisions we discuss that how flexibility in supply chain can help us in handling those uncertainties in the network design decisions. Because these network design decisions are long term diseases and huge amount of capital is also required in putting a particular type of network.

You make warehouses, you make factories, you purchase drugs, so all these are the decisions which you cannot change in the short term, so therefore you should be very careful in making a network which can take care of uncertainties. We discussed about different types of uncertainties in the last session that you can have uncertainty with respect to demand, you can have uncertainty for prices, you have uncertainty of exchange rates, you have uncertainty of different types of market structure.

And then the other type of uncertainty which is coming that is uncertainty of the business models. Now a days different new types of business models are coming day by day and this business models also create impact on supply chain network. Earlier we use to understand business models very clearly that you are giving me a product I am offering you money in lieu of that, but now days it is happening that Google is offering as a service of Gmail.

We all use WhatsApp, we all use Facebook and we do not pay anything to Google, we do not pay anything to WhatsApp, we do not say anything to Facebook, but still we all are using their service. Though there is a business model, there is a profit stream in the business of Google, in the business of WhatsApp, in the business of Facebook, but this is stream is not so visible to us.

Some of us may say that enticement are the major source of revenue for Facebook, some of us will say that they have over data and they send the data to various product companies and

that is the source of revenue. So we all are guessing, we all are trying to speculate that how do these companies make huge amount of profit, but these things suddenly point for us that there are lot of uncertainties with respect to business models also. So you need to handle all these uncertainties in your network decisions and we discussed that how flexibility is the important answer for handling these uncertainties.

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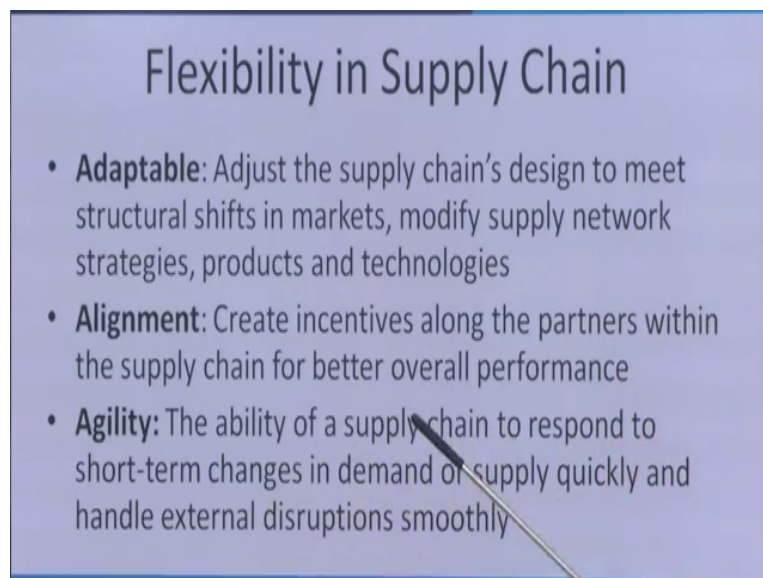
In our last session we discussed in details about the adaptability of the supplies that is one important dimension of flexibility, that has the market structure for changing as you are modifying the supplies network strategies and your supply chain should adopt to these changes. The analytics components where you are making decisions in real time, we have seen during the discussions of forecasting that how adaptive forecasting can help us in improving our decisions.

You are using the most recent data for better for forecasting, so you are these methods are known as adaptive forecasting methods. So these things are required for building flexibility in your supply chain. You cannot have the old regression equation Y=A + Bx giving all the time the values of Y with respect to X. Because as the time will move you need to change the values of A and B, the point which I am trying to say that is you have one regression equation y = A + Bx.

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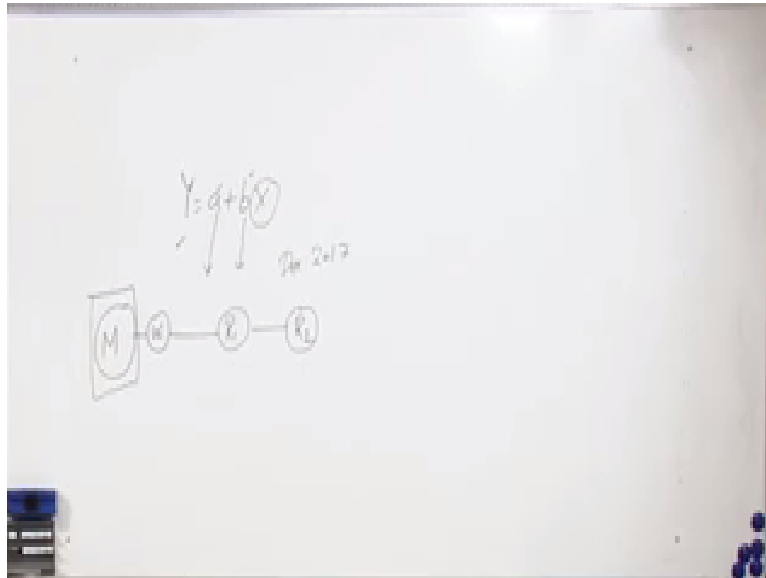
In the demand forecasting where we know that X is some independent factor and we take the value of x from such other sources we have calculated the values of A and B, these are the constant values and these values are taken based on some past data of Y and X. Now for future today I am in 2017 March and from some independent sources I get the value of x for December 2017. I will put that value of x here and corresponding value of Y I will get.

This is my conventional method of forecasting, but what I am trying to make you clear that in adaptable forecasting I need to continuously update the values of A and B also. So I will have a much better forecast for the values of December 2017 for X. Earlier it was not so, so we used to have higher forecasting errors. Our forecasting may lead to higher stocks or under stocks.

But nowadays we want adaptive forecasting where we can change the values of A and B in real time and you can have a more realistic adaptive forecast, so that is the first important element of flexibility in the supply chain. The second is alignment, what is the meaning of alignment, we create incentive along the partners within the supply chain for better overall performance.

Now in supply chain we all know that there are good number of partners, you have wholesaler, retailer and smaller retailers. Now I am not taking the supply chain to the left side of this wholesaler, manufacturer and suppliers are also there. So this is a wholesaler, this is a big retailer and this is a small retail. I am considering right side of the supply chain. Now if I

am not creating some kind of incentive system that is uniformly giving advantage to all the parties.

If this incentive system is biased or for this wholesaler, or for this retailer or for this retailer I will not be able to achieve a good alignment, so the second important element of supply chain flexibility is the alignment and this alignment is possible that I need to create a system incentive system which should take care interest of my all the partners of the supply chain then I can have a better overall performance.

Otherwise you can have plentiful of examples of examples where most of the supply chains before this wholesaler you have the manufacturer also before this you have the manufacturer and the incentive system is designed in such a way that most of the profit, most of the share of the incentive goes to the manufacturer. And therefore these wholesalers retailers are not able to take much of the benefit and this is a poor alignment of the supply chain.

In your earlier session we were talking of middleman and we have large number of examples in our country particularly in India where you have handicraft items, you have cottage industries, you have small farmers. Now these small farmers are those who were involved in the cottage industry, in the Handicraft activities they have limitation for accessing the markets.

And the role of middlemen is very important to take their product from those far places where handicraft items are made, where these vegetables food items are grown to bring it to the urban market, but for that obviously they also want a share in the profit, the incentive system design by these middleman is such a faulty system that it does not give you can say appropriate amount of incentive to the producer, to the villages, to the farmer.

And therefore we have so much debate about the role of middle man in the supply chain. If you can design a proper incentive system where middleman also take a right amount of profit, the right amount of profit goes to the retailer and right amount of profit goes to the actual producer the farmer, the handicraft manufacturer, the cottage industry owner, then probably it will help us in achieving the better overall performance, but this type of alignment between the incentive system is not there.

And therefore you have a problem in almost all types of unorganised supply chains in our country and these supply chains are not finding them self changing aligning with the uncertainty of the external environment. So this alignment component is also very important and alignment is possible when you can design appropriate incentive system. Unfortunately the coordination, the trust between the partners that is not there.

And because that trust is not there we all want to maximize only our incentive, so each one of us is looking for incentive of individual, no one is capable, no one is looking for the incentive of this overall supply chain system and that is another very important source of problem and in case of those supply chains where you can clearly defined the ownership of an individual, when I take the example like this is the supply chain of Walmart.

This is a supply chain of Maruti, this is the supply chain of Dell, this is a supply chain of Hero Motocorp. In these types of examples it is quite possible to develop an incentive system which can give good amount of equality in the incentive sharing, but when I talk of supply chain of vegetables, when I talk supply chain of food items and fruits etc. here I am not able to decide that who is the owner of the supply chain.

And in these cases there is a problem that we are not able to develop a good incentive system along the partners of the supply chain and in that case the problem of alignment will be there, but certainly where ownership is properly known supply chain of Apple, supply chain of Samsung, in these cases you can create a good incentive system along the partners of the supply chain. After adaptability and alignment the third important dimension of flexibility is agility.

Agility is another very important aspect of supply chain flexibility. Now agility we mean that how fast you can fulfill the demand of the customer, your response rate, that that is the agility. Now what agility means, the ability of a supply chain to respond to short term changes in demand of supply quickly and handle external disruptions smoothly, that is the meaning of agility. Now as we have discussed in the last session that supply chains required high speed and low cost.

When I talk of agility this means high speed and high speed is easy to achieve when you have study conditions, you can follow things like make to stalk, you have products readily

available in your warehouse, you have products which are readily available in your retail counter and as soon as a customer comes you can offer product immediately to the customer, so that is very high level of speed, customer comes and you offering immediately without even a waiting time of 5 minutes.

But problem starts coming when you have short term changes in demand when you have the short-term changes in demand then problem start coming, how to achieve the same level of speed, when demand is changed and when demand is changing you will not be able to maintain good stock, make to stock type of policy in these cases, because some time demand is more, sometime demand is less.

And some time you were over stock, sometime over under stock and both these things are not desirable so therefore you require some kind of agility in your supply chain that you should be able to fulfill the demand of the customer within the short time even if demand is changing.

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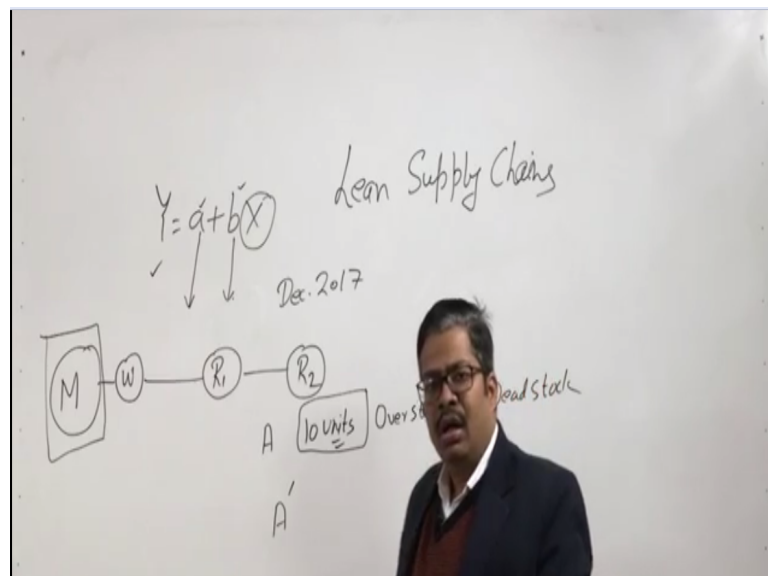
Now for that purpose there is a term we all know that is live supplies, we will discuss in our coming classes in detail about lean supply chains, but lean supply chains are those types of supply chain where we try to reduce the waste in the supply chain. We consider that those who are lean and thin we consider there is a simple formula that we consider those who are lean and thin they are more agile, they can change very fast, their reflexes are very fast and those who are bulky they are slow.

And same thing applies to the supply chain. If I am leaving my supply chain is lean, the meaning of that lean supplies when is that I have less amount of inventory at each stages. I have of minimum waste in my supply chain at each stage. So my supply chain can change very quickly as per the demand of the customer. Otherwise what will happen for example I have a product A, today I have a product A and at add retailer 2 I have 10 units of this product A.

Tomorrow because of some reason demand of this product A goes down and now customer wants a new variant of this product A that is a A dash, customer wants A dash. Now I already have 10 units of A in my stock, so I will be hesitant to procure A dash, because I will wait that I should sell my 10 units first and then I should procure A dash, but if I procure A dash because customers are wanting A dash now, so I need to force to purchase A dash.

So in that case these 10 units of A may turn to the overstock and maybe after sometime these overstock metre into the dead stock, demand will totally be out and only A dash demand will be there. Now there is another retailer who is having only 2 units of A, another retailer who has only 2 units of A, for that retailer it is much easier to procure A dash, so the meaning of lean is that you need to have a minimum amount of inventory, a very minimum amount of inventory.

So that as soon as demand changes in the short term, you can immediately procure new products and if you have a stocks of your previous products in your warehouse, in your retail counter or wherever you keep your finished goods inventory, you will be hesitant to change or to procure new product and by that time your competitors must have procured the new products.

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Lean Supply Chains
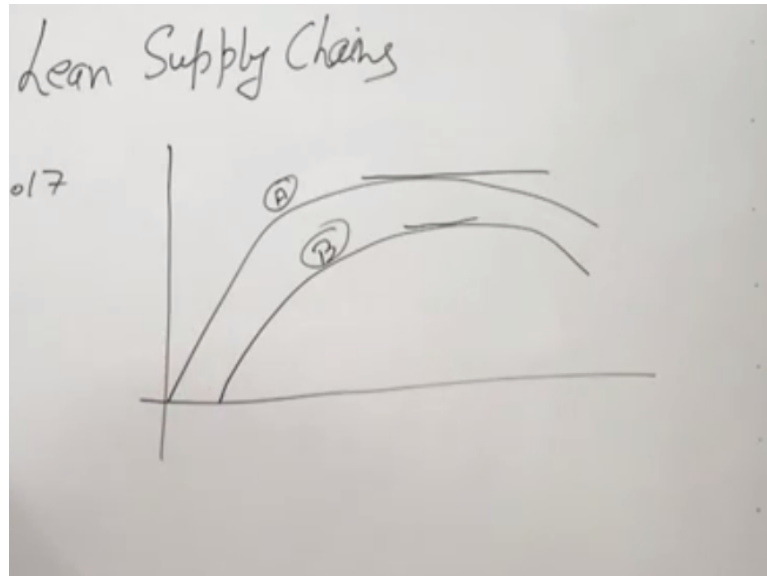
And then you will be behind in the competition, it is also very important to understand one more phenomena because that will help us to understand the meaning of agility. Now what happened when you are in this process of lean and agility, we also have a particular phenomenon of double advantage, now what is the double advantage, here normally it is seen that if I introduce this is a product life cycle very simple representation of product life cycle where I am introducing a product going to come growth period and then maturity period and finally it will be declined.

So this is product life cycle of those who are responding to the changes at the early time and another life cycle I am making for those who are responding to the product life cycle at a later stage, so this curve A represents product life cycle of those marketers, those supply chain decision makers who are able to introduce products to the market at early stage and the curve B represents those who are introducing a later stage.

Now you yourself can see that for the early introducer those who are as I those who are able to adapt to the changes early they are able to achieve higher market share, so this height, this height indicates the market share, so they are able to go to the higher levels of market share and B is at the lower level. So those who are coming late to the markets they will not be able to achieve that higher level of market.

Second thing you see the span of A, the life of the product A is for longer duration and the span for this company B is for the shorter duration. So this is the double advantage, you will have higher market share and you will be there in the market for the longer duration, for B

you will not be able to achieve that level of market share and you will have a smaller span of market period in this case.

So the concept of agility is very very important, obviously company A is more agile and company B is less agile and the reason maybe because leanness of your organization. A maybe more lean and therefore could respond quickly to the requirement of the market, B is bulky, so B took time to change itself to the requirement of the market and therefore B came late into the market with the same product and you can see finally the advantage associated with the agility.

So this agile supply chains are very very important and we need to understand that what are the different types of waste in my supply chain and with all possible effects I need to reduce, I need to eliminate the waste and one important waste like I discussed about the inventory, inventory is 1 type of waste in my supply chain. The other type of waste can be the waiting time, if I do not have a good route planning.

If I do not have a good route well planning and my trucks are going for last mile delivery and at the last mile delivery trucks are waiting for unloading, if my ships are waiting for unloading that is also a waste because I am wasting my time, so I need to eliminate that waiting time also. So when we will go for lean supply chain class we will see that what are the different types of waste.

And we need to eliminate those waste, so that we can achieve in higher degree of agility in my supply chain and that high degree of agility in the supply chain will help me to achieve the objective of flexibility in the supply chain. So and because I am not keeping much inventory, I am not keeping more drugs, I am not keeping much of my infrastructure and therefore I am very fast in responding to the short-term changes in the demand.

As well as I can also handle external disruptions very smoothly without changing much in my system. If I have developed huge warehouses across the country and now you see the time of online retailing is coming, so in that case by big stores will be of less use and it will be a challenging task to sell those stores because no one else will be wearing those types of store.

So it is important that you need to identify that what type of resources you need to build and what type of network you need to build, so that whenever question of agility comes you can respond smoothly without changing much in your organisation. Otherwise you need to adopt or you need to change as per the situation but many a time these changes create lot of resistance, it is not very simple to adopt to new things.

So there are courses on management of change, but the concept of agility says that if you have minimum resources, if you have optimum resources you can change smoothly without creating much disruption in your organisation, so the ability is third important dimension of your flexibility, so with adaptability, alignment and agility if we have these three things in our organisation we are a flexible organisation.

And flexibility is one of the key for making our supply chain network suitable for handling the uncertainty, it can minimise the impact of uncertainty in my network decision of supply chain. So we stop here in this session and in our next station we will discuss some of the mathematical aspects of network decision under uncertainty. Thank you very much.