

Supply Chain Analytics
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Lecture-40
Trends, Challenges and Future of Supply Chain

Welcome back, dear participants of this course so now we are coming to the end of this course and in the final session of this course we will like to summarise what we have discussed in earlier various sections and what will be the future direction of supply chain, what are the trends in the supply chain?, what are the challenges in this supply chain?, so all these things we are going to discuss in the session. So that this course is not going to make you an expert of the supply chain.

Rather this course is an attempt to create a kind of foundation about the various types of supply chain decisions, it can sensitize you about the challenges of the supply chain, it sensitize you about the requirement of supply chain for better decision making, it can sensitize you about the environment in which a modern manager makes the decision for the supply chain.

So this session will tell you about all those various aspects which are there which make supply chain more interesting which makes supply chain has won the function of the organisation which is you can say key for the profits for the value of the organisation.

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So we start with this discussion that supply chain as we discussed in the very first class is to ensure the availability of the products to the customer where customer wants, what customer wants, how much customer wants to give the answer of all these things, the discipline of supply chain came into existence. Over a period of time when competition started growing and we discussed the various phases of evolution of supply chain.

We discuss this phase where Ford Motor was there one side and Ford Motor was having a very integrated supply chain, every types of supply chain where from mining of iron ore to the distribution of made cars was controlled by only one company that was Ford, so that was one extreme of supply chain, so initially the discipline started from that type of highly integrated supply chain.

And over a period of time with the Japanese system of management where Toyota created a very much disintegrated model, created so many vendors in the supply chain, that I am not going to meet all the components for car, I will procure components from different vendors and that model became very popular and nowadays we all know that in a supply chain of 1 OEM there are large number of vendors.

And you have so many distributors also in a supply chain and you guide them you ask them to behave as per the company's policy but you do not own them, so you created it decentralized model so the earlier model of Ford was highly centralised, then this Toyota model of supply chain is highly decentralized, so the whole world moved from that integrated model to this disintegrated model.

Then over a period of time with the help of companies coming all across the world when we started facing the heat of competition same came to supply chain also and this is the third revolution which came from the ideas of Dell company, Dell power customer to design their own products until late 2006 customers were giving orders online to Dell and Dell was trying to give products as per the unique orders given by the customer.

So that was another important evolution in the concept of supply chain and the further evolution of that we all see in present time is in the form of e-commerce where customers are not visiting the brick and mortar stores they go to E-portals, they go to various types of E-

suppliers, e-commerce site we say in day today language and these E-Commerce sites are the new retailers of the model era.

And all these changes which I just discuss are in last 100 years, so in these 100 years the subject of supply chain has become such a vital issue that many companies, the companies like Amazon, companies like Walmart, companies like Maruti in India. These are highly successful because of their very very adaptable, very very efficient, very very effective type of supply chains, but in all the supply chain discussions our focus is entirely as we discussed in the first or second session to increase the supply chain supplies.

We want to develop supply chain which can increase the surplus of all the partners of the supply chain, it is very interesting in the supply chain that we do not talk of profit of individuals, we never talk of profit of individuals and I again give you a warning message that supply chain is highly collaborative activity, so you should always think in a matter of collaboration.

We never talk of individuals profit, individuals forecasting, individuals inventory, all these terms are prohibited in our supply discussion, so we only talk in terms of how you can increase the profit of entire supply chain, how can you reduce the inventory of entire supply chain, how can you make forecasting more effective for the whole supply chain, so all the discussions are happening for the entire supply chain.

So that is very very important in case of supply chain, but in all these discussions when we are talking of continuous increase of surplus of supply chain and when surplus is increasing we say that our supply chain is performing very well. But in this race of supply chain surplus we have ignored this first. Which I mentioned here that is the human aspect. Human aspect is very very important and without human aspect our business cannot survive.

So the first important challenge in front of supply chain address human related issues also and therefore the extension of this human concept human aspect the word has come where we talk of humanitarian surprises, a new type of supply chain discussion has started that is humanitarian supply chain many of us will take the discussion of humanitarian supply chain into the disaster supply chain that some accident has happened, some natural calamity is there

and to fulfill the requirement to provide relief rehabilitation kind of support to the victims of those calamities.

We need to provide relief material, so that is human aspect of supply chain, but it is much more than that when I am producing products like mobile phone and we all are consumers of mobile phone it is almost impossible now days to think anybody without mobile phone and when all of us are using mobile phones. So from where the raw material is coming, raw material is coming from some of the African countries.

And what is the condition of those people who are providing raw material for our mobile phones, so if you go to YouTube and see those videos of children getting into the mining activities for getting the raw material for your mobile phone it is very difficult to use mobile phone after that because those pictures will be haunting in your mind. So the human aspect is also very very important that how much are we consuming?.

What are we consuming?, how do you think are given to us?, what is the process of giving those thing to us, so all these are the subject matter of human aspects of supply chain, we become many times in human in race of our supply chain surplus, so the first important which supply chain must address that we should not ignore humanitarian. We should not ignore humanity for the sake of supply chain surplus.

The second important future trend which is there because of development of computer science, various things in supply chain because if you are located very closely around your customers and your vendors, so without even internet, without computer science you can manage your business as long as your business is of low size. But as your business growth your vendors become international, your customers become international.

So you need some kind of technology help and thanks to internet and computer science and thanks to web technology that because of rapid development in the field of IT, computers and Web Technology we are able to use those technology in the development of supply chain management. So that is important area the whole discussion in last so many sessions is only possible when we have good computers with us, without computers it is not possible to apply those types of algorithms.

You are not going to make long pay of tables using your calculator on register, it is only possible when you have some kind of spreadsheet program, without spreadsheet it is not possible to develop such type of tables. So the computer is very very important, particularly the level of automation in Indian supply chain is not very high, it is now very promising as the supply chains of our developed nations are using.

So there is a challenge, there is a potential opportunity also. Both these things are there, that we need to increase the uses of computers, internet in our supply chain, so that because we require for the analytics purpose information in real time. And that information availability in real time is only possible when you get information instantly from variety of sources and probably the increased use of internet will help us, will facilitate to achieve this.

So that is a very important things that we need to incorporate more use of internet in our supply chain. And nowadays many of you may be aware that it is not simply IT in the supply chain. We are moving one step ahead it is IOT Internet of things, which is coming in a big way in the supply chain. In India not much research has taken place in the field of IOT, so those who are interested in a kind of research career they can think of that how IOT can be used in supply chain.

There are certain journals in which some papers are also there about IOT and supply chain. Now many of you know what is IOT when I use heterogeneous devices over internet that is a IOT, so if I use I can sync my smart phone with my colour television, so it is a kind of IOT that these two devices are not compatible with each other, but because of Internet of things I can connect these two devices and I can command from one device to others.

Similarly in my supply chain if I start using IOT, so at each stage from procurement of raw material, the inspection process of raw materials to the manufacturing, to the warehouse, to the distribution to the consumer at different stages I can use IOT and this IOT uses will certainly increase it is expected the efficiency and responsiveness of the supply chain.

Because these are the two most important things in a supply chain, efficiency and responsiveness I want things quickly, and I want things at low cost. So when I want things at low cost it means efficiency and when I want things quickly it means responsiveness, so as a matter of fact we all are consumers and we want both these things whenever we purchase a

product, we want that the product should be available to us at low cost and simultaneously it should be available within no time.

And therefore concepts like uses of IOT may help us in achieving these objective because you can easily monitor the movement of your products in the entire supply chain, you can control the movement of the supply chain, you can not only simply monitor, because monitoring you are doing by using the RFID tags, barcode tag, and that monitoring was already happening.

You know that when you are doing a speed post and that speed post envelope bears a particular type of barcode and you have that consignment number available with you and if you login to the Government of India department of post site and you put that consignment number, so you can easily track the location the movement of the product, but with IOT what is going to happen?, with IOT I can monitor, not only monitor I can also direct the movement of the consignment that where it should go?, at what time it should be go.

At what time the customer will be there, so the product should reach to the customer when the customer is there, we all know many time the courier wala, the Postman come to our house but we are not there and then the return without delivering the packets, but with IOT it is possible that I can connect all these things and I will direct that delivery boy sitting in my office that you deliver this product at a particular time or the device will give signal that the receiver is available and the product should be delivered at this time even I do not required to be dictating it from my office.

The device itself will communicate that yes the receiver is there and the packet can be delivered at a particular time. So these type of changes are possible with the use of IOT, so it is a big thing for the future and the supply chain must stay in India particularly if I am talking that be Indian supply chains must think of adopting tools and techniques which can make IOT part of their supply chains.

Normally at the present time it is believed that only those players where the high unit value is there of the product, they are interested in application of IOT. But I am very sure that with more research and development in this field this IOT will be available to other players also

where the unit value is not very high. But another important issue in the supply chain is environment and this is really a major threat to the Global world.

Now what is happening let us take a simple example because of globalisation your vendor is in Africa, I am making product in India and supplying these products to America and this is what we say we must take the advantage of globalisation, procurement from those countries where you get the very cheap raw material, produced where you have the availability of the skilled labour at the low cost and sell where you get the maximum value for your product.

So this logic is very simple and we understand this logic perfectly, but what is happening because of this you are transporting the material first from Africa to India, so lot of carbon emission takes place when the product is coming from Africa to India, then finished products from India is going to America again lot of carbon emission will be there in transporting products from India to America.

So now this is something which is against the environmental ethics we need to see that how we take the advantage of all these low cost resources, how we make our supply chains more efficient but for the sake of making them efficient we should not compromise with the environmental issues. We have so much gifts from nature in each part of this world that if we try we can sustain our life from the local resources.

But saying this is against the principle of globalisation. So we need to make some kind of balance between these two things that you should be able to take the advantage of globalisation and at the same time you should create some kind of balance with respect to your environment issues. If this balance is lost then there are going to be enormous challenges.

If our survival is in question then whatever amount of supply chain surplus I have there is no use of that. So we need to see that what is the direction of growth and whether the direction of growth is sustainable or not and that is certainly my next future issue that is the sustainability. We are looking for growth, we are looking for hire supply chain surplus but whether that whole process is sustainable whether it is long enough to survive.

Sustainability means a thing which can sustain for infinite amount of time, so whether this whole process is actually sustainable or not. Now that sustainability will depend on various issues like if my supply chain in our last session when we were discussing about the flexibility in the supply chains one point came that is the alignment. Now my supply chain should be aligned properly, it means the supply chain should take care be interest of all the partners in right proportion.

If supply chain is bailed towards some of the partner and they take more by out of the overall supply chain surplus or disproportionate by out of the total supply chain surplus that this is the misalignment and if something is misaligned it is not going to be sustainable. So what I am trying to say that if in a supply chain there are extra benefits for some of the stakeholders at the cost of other.

These businesses, these supply chains are not sustainable. So we need to see that how supply chains are to be sustainable, if it is part of a society, so the society must feel that this supply chain is taking care of the society. There are male members, there are female members, my supply chain should not differentiate between male and female. There are people of different age group, there are people of different religious background, different language etc.

So I need to see that my supply chain is making a justice with people of all the background all the ethnicity, all the races etc. My supply chain is taking care of environment, it is giving the due recognition to the environment and my supply chain is also viable, it is also producing sufficient amount of profit. So that it is attractive enough to be in that supply chain, if my supply chain is not making a decent profit I will move away from that business.

And in that case I may think of some other business, in your area as you will see some people, some shopkeepers they keep shifting the agencies, they keep shifting the business interest and this happens because the supply chain in which they are dealing is not lucrative enough to attract these people. So that economic sustainability is also required, but the most important thing is that we need a proper balance between these three types of sustainability.

You have economic sustainability, you have social sustainability, you have environmental sustainability no economic sustainability at the cost of social and environmental sustainability not environmental sustainability at the cost of economic and social sustainability can never

happened social sustainability at the cost of economic and environmental sustainability again not desirable. So you need to create again a proper balance between these three types of sustainability.

So that you have a long term plan of sustainability and this is again a very important future challenges for the supply chains that how to make a balance if you want to develop supply chain which is only for one type of sustainability that is very easy task, if I only thing of profit and profit all the time by economic sustainability I can develop the time of supply chain.

But when I talk of developing a supply chain which takes care of all three types of sustainability that is a challenge. So that is another future issue which we need to handle in our supply chain that how to maintain balance between three different types of sustainability and then one of the most important thing and lot of research is happening in this area also that is risk management.

Now risk management is something like handling the uncertainty of the supply chain, our last few session we hears about handling the uncertainly in the supply chain, so risk has 2 dimensions. There are risk which can be quantified and there are risk which cannot be quantified, qualitative type of risk are also there. So we need to understand that what are the quantitative risk and what are the qualitative risk in my supply chain.

For quantitative risk we can take care with the help of different types of risk management softwares, we can use different type of risk management techniques particularly what we discussed in the financial management, so those risk management techniques can be adopted. Sometime you accept the risk, sometime you avoid the risk, sometime you mitigate the risk. So there are different types of risk management strategies available.

And then there is a qualitative risk also which is difficult to quantify and it is our foresightedness, it is foresightedness of the supply chain manager to understand to predict, to visualise the possible risk in the supply chain and these possible risk in the supply chain will help us to develop a robot supply chain. Otherwise we have done the sensitivity analysis also.

If I am not having a good risk management incorporated in my supply chain my supply chain will debate with little bit changes in my input parameters. So it is important that I develop a supply chain which is robust enough and we should not change, we should not deviate which should not fluctuate much with the slight changes in the input parameters, though I need flexibility in supply chain.

But if I take a supply chain where it is not robust enough then lot of fluctuations will happen and in that case I may need to redesign my supply chains time and again. So therefore risk management is also very important concept in the future supply chains where we take lot of inputs from the financial management backgrounds to handle the risk management issues. Since it is highly uncertain environment and daily new challenges may emerge.

So I cannot say nobody can say that we have a comprehensive list of issues for future supply chain. There will be new challenges coming day by day, sometime you have daily new regulatory environment, so when regulatory environment changes these environment will also give you new type of challenges, when you see a new regulation comes from Government of India, the new regulation make create demand for a new product admit totally finish the market of some of the existing product.

So you don't know government of Bihar in India band liquor so as a result of that the demand of liquor in Bihar decreased it finished. So the regulatory environment is also very much uncertain and it can also affect our supply chain to a great extent. So with these things we discuss the various issues which are important in designing a future supply chain and the analytics will help us in describing the events which has happened descriptive analytics.

The predictive analytics will help us in predicting the future what is going to happen in the future with this type of description and the third part it will help us in getting the optimum solution, the descriptive type of analytics, so with using the operation research techniques with using techniques like decision tree etc, which we discuss these are the part of that prescriptive analytics.

Where we are using that what is the most optimum solution giving these conditions, giving these scenario, so I hope that we had a good learning time during the course, during these various session and now my best wishes to all of you for a very successful use of whatever

we have discussed during these 40 sessions of supply chain course and I also wishing you very best for your examination of this certificate course. Thank you very much for being in this course.