Decision Support System for Managers
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Module - 10
Decision Support System for Customer Centric Value Driven Decisions – Designing the Service System
Lecture - 49
Service Systems: Characteristics; Failure and Recovery

Hello and welcome to "Decision Support Systems for Managers"! We are into module 10, 'Decision Support System for Customer Centric Value Driven Decisions - Designing the Service System' and we are into lecture 4 of this module that is 'Service Systems: Characteristics; Failure and Recovery'; ok. Now, let us understand: what is a service system; ok. A service system has certain characteristics that if there is a service failure, then perhaps in most cases, the entire system goes for a toss; ok.

If, there is a failure the entire system goes for a toss, there is a temporary failure, but in everything is running in sync the system also runs smoothly ok. Let us take the example of the service system that is a train service ok. Be it the local train, be it the express train, or be it the metro railway, or the tube rail system. Now, if by chance one train somehow stops somewhere in the middle. Either it is derailed or there is a signal problem or there is an engine problem, but the train is not moving.

What will happen? The entire length behind this train that is the entire queue behind this train the of the other trains all get effected and the entire schedule gets disrupted and goes haywire ok. So, if there is a service system in case there is a failure then there is a lot of problems ok. Let us take a hospital ok. Suppose god forbid there is an emergency and a patient is brought into the hospital.

Immediately there are certain things which are to be followed, that is the moment the patient is an emergency immediately blood pressure level, heartbeat, everything has to be monitored and immediately treatment has to start. Patient name, address, phone number, where he or she is from, whether the payment has been made all are in the next level; ok; but immediately treatment has to start.

But, suppose, but then suppose the long back this not long back means some years back, there was a huge fire in one of the hospitals in Kolkata, one private hospital in Kolkata; ok, huge fire. Now, what happens? Immediately the patients have to be brought out from this hospital and they have to be shifted to some other hospital.

So, whenever there is a so two things are happening simultaneously. Patients have been brought out that is again there is lot of pressure on the service system, because service system is designed with something and now you are putting lot more additional pressure on the service system. Second is you are also taking the patients to another hospital, which essentially means that in that particular hospital also, their service systems there is lot of pressure on that service system also; ok.

So, this might lead to one is pressure on the service system, then there might be some service failure also ok. For the train anyway if the train gets derailed it is a service failure for all the subsequent trains in hospital also there is a problem ok. So, these are examples of service failures. And, so, when you design a service system, you will have to be very careful on whether you have thought about every aspect of their service design or not ok, you have to think of every aspect of their service design.

What will happen if there is a service failure? What will happen if there is a sudden change or surge in demand? Ok. How will the service system react? Is your service system capable of absorbing the additional load on the system ok? Clear many people say that the in Kolkata the proportion of roads is much less than the other cities roads as compared to the total space it is less. But, we will have to understand that this service system was designed at least 150 years back; ok.

Nobody anticipated perhaps that such will be the population density and such will be the load on Kolkata city. So, designing the service system is very-very important; you will have to look into that. Sometimes you will hear bridges, some bridges collapse. Forget the engineering dimension, but one important point is we have designed the bridge to handle a particular amount of load, but nobody ever imagined that trucks will be 20 wheel trucks or 24 wheel trucks, nobody ever imagined.

So, is the bridge designed to withstand that much of load that is traveling by the bridge? So, many dimensions are there. So, designing the service system is very-very easy, said than

done; ok. So, today we will learn how to design a service system, what will happen if there is a failure and how to recover from that failure; ok.

Keeping in mind whatever we have learnt over the last 3 weeks, that is whatever we have learnt in Six Sigma; ok. Your service system has to be designed in terms of some specification limits some control limits and Six Sigma design ok. So, let us move; ok.

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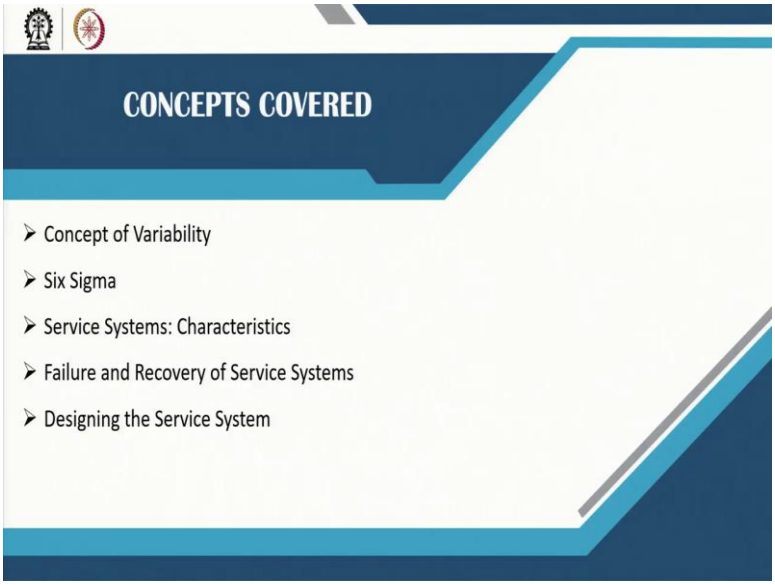

So, these are the things that we plan to cover and we have already covered ok. Failure and recovery of service systems we will do and design the service system we will do.

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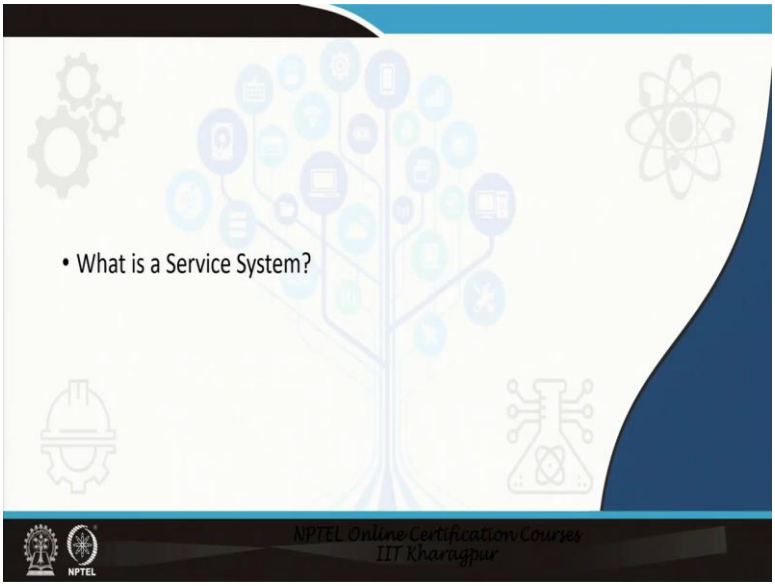

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What is the service system we have just now told you? Ok. Now, today or now we will come to service systems for public transport; ok. And we will take care of or we will design the service system for the metro railway; ok; clear; yes; now, you see let us many of you might be in cities where there is no tube rail but at least you have traveled by the express train or passenger train or the local train; the principle is same; ok.

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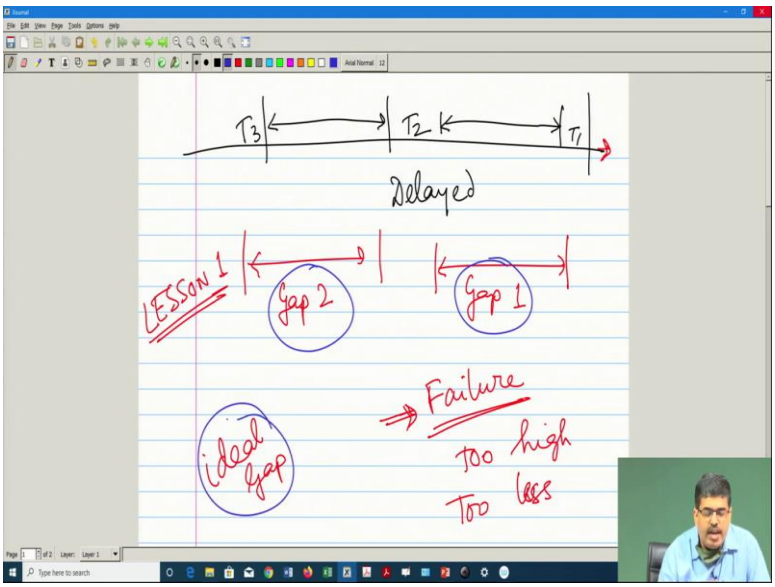

Here is a railway track and here is train 1 ok, here behind it is train 2 and here behind it is train 3 ok. If train 1 somehow gets delayed, train 2 is bound to get delayed. Provided we want

to maintain this particular gap between 2 trains ok. If, train 2 gets delayed, train 3 is bound to get delayed provided we want to maintain this gap between 2 trains; clear. Now, so, what is happening here? If, you see that 2 3 things are happening, this is train 1, train 2, and train 3; right.

Now, one is there should be adequate gap that is first lesson. Lesson 1, the train is moving in this direction ok. So, lesson 1 in designing a service system is there should be adequate gap between 2 successive players or 2 successive activities; ok. There should be adequate gap to prevent a system from having a failure. To prevent a system from having a failure there should be adequate gap ok, clear to prevent a system from failure there should be adequate gap.

Now, this gap this first this gap should not be too much, should not be too high, this gap should not be too less also, should not be too much more, should not be too much less. So, now, what is the ideal gap? What is the ideal gap? The ideal gap is something which is very difficult to quantify. It will depend on the characteristics of the system ok. For example, so, up to this is clear then we can move to the next slide; ok.

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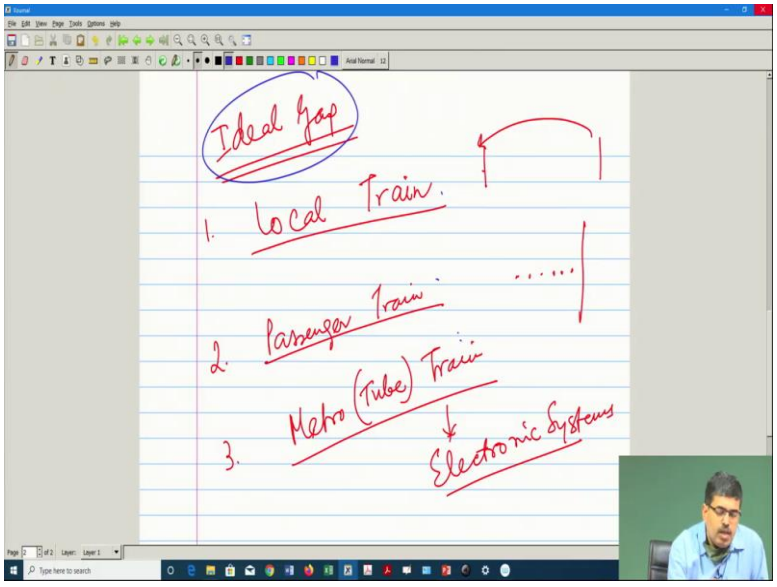

Now, what is the ideal gap? As we were mentioning what is the ideal gap? The ideal gap is basically ideal gap it depends from system to system; ok, if it is a local train, if you are from Mumbai or Kolkata, to some extent Chennai and Delhi also. If, you are from Mumbai and

Kolkata particularly these are the 2 cities where there is lot of local trains, Chennai also, there are many; Delhi also, there are many.

Local trains you will see at the destination point trains are keeping on standing one behind the other in that signal they are not getting platforms. So, what is the ideal gap is something. Now, if it is a passenger train a different sort of ideal gap. If, it is a tube rail or the metro train metro, or the tube train, the ideal gap is different.

Here particularly for the third case for the tube rail the ideal gap will be depending on how your, electronic systems are developed; ok. How your electronic systems are configured? Ok. How your electronic systems are configured? Ok. The passenger trains you have to have enough gap between 2 trains, because the train has to enter the platform wait their passengers will offload, then the train will move out and go to the yard; ok.

So, passenger train time required is much more local train not time is not that much required, because there are 2 driver cabins at both ends. So, driver just needs to change the direction and again move out ok. So, what is the ideal gap depends on what situation we are talking about ok? So, lesson number 1; ok.

So, what was lesson 1? Let us go back lesson 1 was there should there is a gap ok, there should be a gap and we want to know what the ideal gap is; ok. Lesson number 2 is what is the ideal gap? The ideal gap is different for different types of situations; ok; clear.

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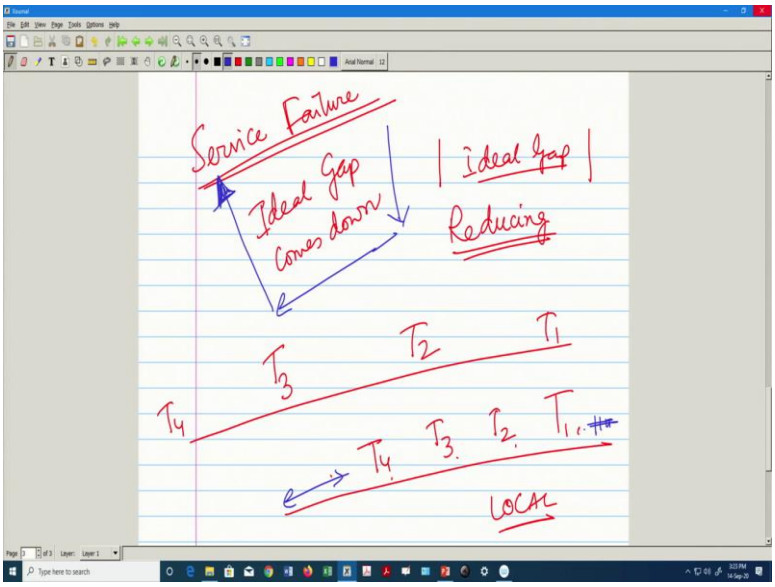

Now, let us go to the situation when there is a service failure. Now, when will there be a service failure when somehow this ideal gap is reducing; ok, when somehow this ideal gap is reducing. So, here is train 1, here the ideal gap is this T 1, T 2, T 3, but somehow this train is standard behind there are so many other trains T 4. So, somehow this gap is now coming down, because this track this railway track this railway track has to accommodate more number of trains behind it; ok, this is a local train; ok, this is a local train.

So, the local train is standing at signal, the next train is standing next particularly during the office hours, next train is standing at the next signal, next train standing at the next signal, etcetera. So, the ideal gap now is coming down.

Same thing for a road transport also, but a particular signal you know as an when you are entering the city your ideal gap comes down; ok. So, whenever this ideal gap comes down, whenever this ideal gap comes down, whenever this ideal gap comes down, this is an indication of, this is an indication of service failure; ok, this is an indication of service failure, slowly we are moving towards that; ok.

And, if trains keep on standing for some reason there is a technical fault here trains will keep on standing that is an example of a service failure definitely; ok; this one gives an indication that is ok. So, what do you do actually somehow you need to speed up this process, there are different ways by which you do it ok. So, there is an indication of service failure; ok.

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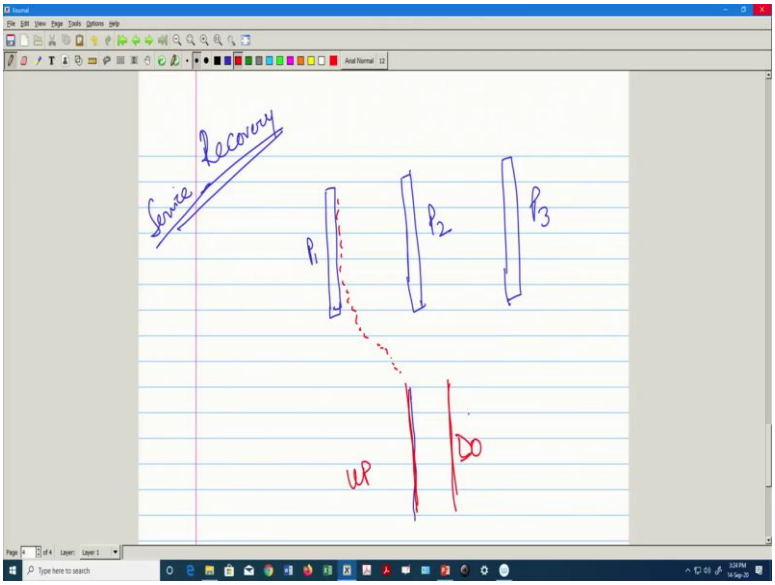

Then, next case; what do you do, you have to recover; right. There should be a recovery agreed. So, there should be a service recovery; right; ok. Now, what is service recovery? Let us take again the example of the Mumbai stations clear. This can be true for any stations as such clear there are 2 tracks I will put the tracks in red color; ok.

Now, this train comes, this train goes into platform number 1 ok, this is the up line and this is the let me change, it this is the down line and this is the up line; ok; this is the; so, trains will come out from this line and down line trains will enter; ok.

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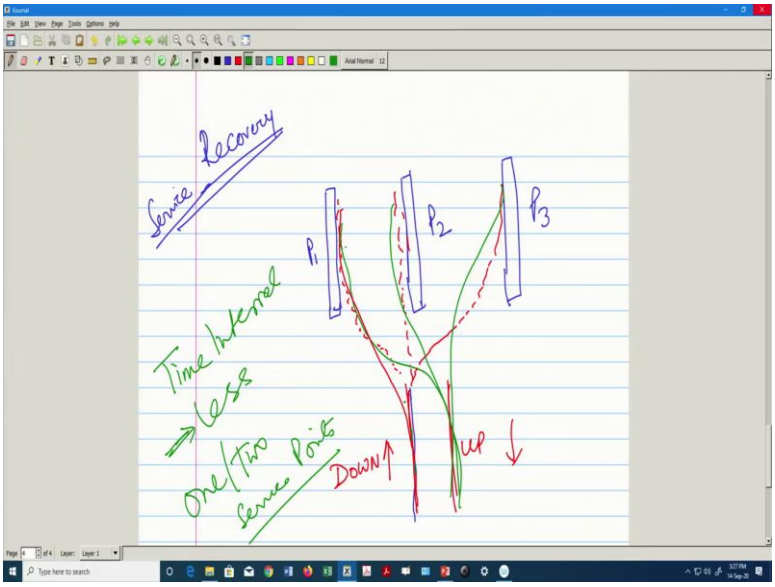

Now, so, the first train comes it goes in platform number 1 by this time the second train is already behind. So, it goes into platform number 2. Now, by this time this train has come out this let us take the green 1, this platform number 1 the train has come up and taken the up line, by this time another down train has come. So, this down train now goes this down, train now goes and goes into platform number 3.

Then, again platform number 2 this train comes out and goes into up line. By this time again another down train has come and this down train again goes into platform number 1; ok. So, and by this time it is over then platform number 3 comes out and goes into this way. So, basically whenever you have for service recovery when the time interval. So, what is the lesson that we learnt here?

When the time interval between 2 processes, when the time interval between 2 processes is very less, when the time interval is less; ok; have 1 or 2 extra service points, have 1 or 2 extra service points; ok, have 1 or 2 extra service points that will solve your problem; ok. So, service system in case even if there is a problem if you have some sort of a service recovery mechanism that helps; ok.

And, that is why you will see all over the country; everywhere we are trying to have some more railway platforms; ok. Railway tracks yes we need it, but railway tracks getting railway tracks is lot of expenditure, so, at least if we can have more platforms, that solves the problem ok. So, in some cases you will see that platforms are not possible, they are building up another set of stations or they are short terminating some trains a bit far away.

Like say for New Delhi you have 2 or 2 more junctions; one is the Hazrat Nizamuddin Junction and the other some trains will start from Faridabad also; ok. Faridabad Junction Hazrat Nizamuddin, then I think there is one more I am not able to recollect right now. For Howrah also, Howrah junction very very old railway junction we have Santragachi Railway Junction we have Shalimar Yard Shalimar Junction.

So, again wherever there is such a problem and we have to recover services, you have 1 or 2 more service points as we have mentioned; ok. So, this is one way by which you can have service recovery now. So, this is one aspect. Now, our second aspect is as we were mentioning. So, this is service system for public transport ok. Now, next is service system for tube rail; ok; service system for tube rail. Now, here in service system for tube rail what we are doing is ok, in service system for tube rail again similar issue.

But, then here as such the system the gap between 2 points is less and the system movement in the system is such that the chances of delay are less. So, here for the time being we are not having one extra platform but we are having one extra railway track, but that is at the extreme end; ok. What we are doing is let us now let us look at the piece of paper that has over the board; ok, what we are doing is ok. Here is platform 1, here is platform 2; ok.

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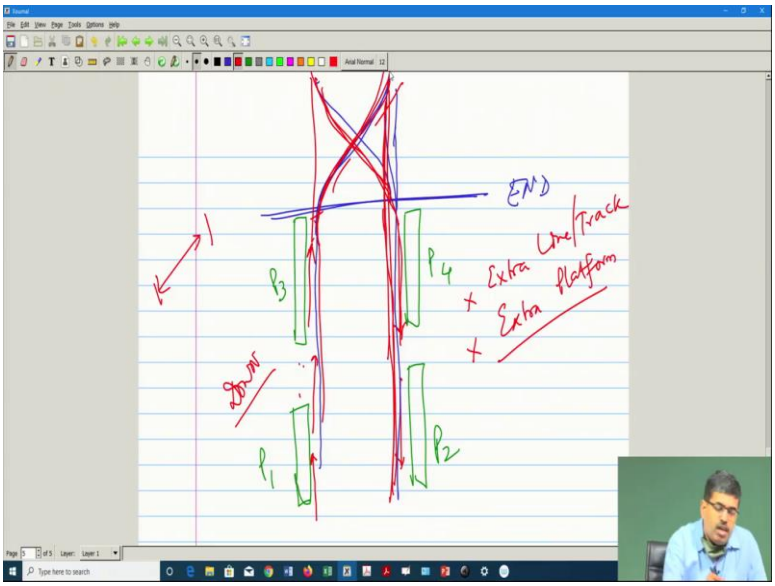

Let us make this is platform 1; ok, platform 1 platform 2, platform 3, platform 4. So, train is moving from this direction the train is moving; ok; train is moving; ok; and train is coming this way; ok. Now, what it does is what the train does is the train is moving in this direction; ok; this is the last; this is the end point; ok; end point; end.

The train takes a turn into this track this track is extended actually ok, this track is extended this way ok. The train goes into this track then again comes in this track ok. The train goes in this track sorry train goes in this track and again comes in this system. Similarly, there is another track that is available here. In case the train needs to change track in another platform, you can come in here.

So, here what I am repeating again just look at the diagram, this is the down line. The down platform is moving the track is just linked to the up platform track; ok. So, down platform is going and up platform it is coming this way ok. So, this just changing track the driver is changing cable and coming this way.

Similarly, there is another link here in case it is required they will use this also ok. So, here what was what was happening, we did not need any extra line or extra track, we did not need any extra, we did not need any extra platform also not required; ok. Why were we able to do this? For the local train in Bombay or even in Howrah we could not do this, we needed one extra track or one extra platform.

Why were we able to do this here? We could do this here because we could do this here because this time gap between 2 trains, this time gap between 2 trains, were so precise, was so systematic, was so well maintained, that we knew that the next train we will not arrive before 5 minutes or before 7 minutes.

Local train that is not the case, the suburban local trains, sometimes train get halted at signals, sometimes passenger moving up down. So, some stations they have to stop for 1 or 2 more seconds; ok. So, here the time gap is so, precise the system is so, well maintained, that the system could be designed very well even without addition of a service facility;y ok.

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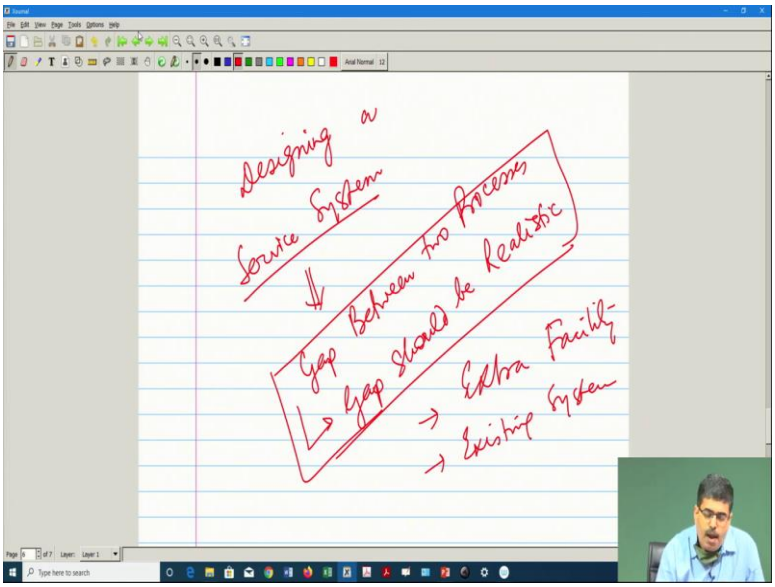

So what is the learning outcome? The learning outcome is whenever you are designing a service system, whenever you are designing a service system be careful of the gap between 2 processes. But the gap should be realistic, the gap between 2 processes as to it is be very careful and the gap should be realistic.

Like in railways we said wherever the gap cannot be maintained, cannot be controlled, we have to have one extra facility, we have to have one extra facility. Wherever the gap is manageable there with the existing system, with the existing system we can work ok, clear. Now, the question comes ok just a second you just have a look at it this is the learner.

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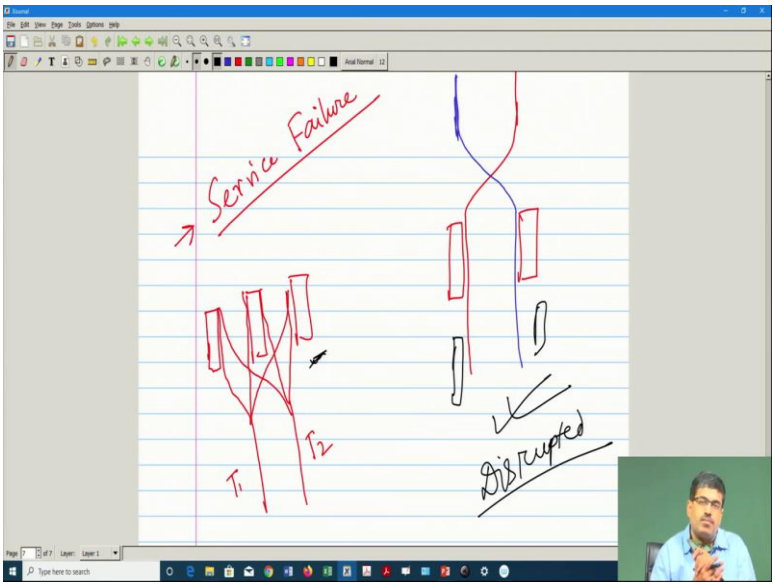

Now, now the question comes is when there is a service failure. How will you take care of? Ok. So, whenever there is a service failure better see, which system will be disrupted first, this system will be disrupted first. Whenever there is a service failure this system will be disrupted first, this system will not get disrupted that to that extent, this system will not get disrupted to that extent.

Because, this is the end point to have some you will have some buffer, but what is the system is such in between if some problems happen in between with the other stations, the entire system gets disrupted. That is why you will see that in many railway stations there are 3 platforms. After every 2 or 3 or 4 railway stations, there will be a railway station, which has one extra platform; ok.

Normally, railway stations if there are 2 platform railway stations every 3 stations or 2 stations there will be 1 extra platform. This is done to take care of this service failure and service recovery, you will have to have there should be a platform on which a train can go in one additional train; ok. So, this is an example of service failure and service recovery; clear.

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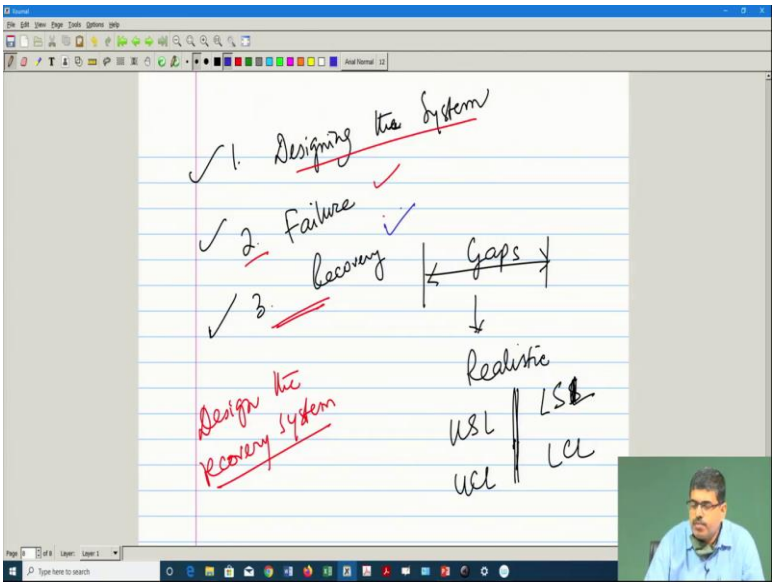

Now, sorry now; so, designing the system failure and recovery, now designing the system failure and recovery these were the 3 points; ok. So, what did we learn? Designing the system be careful of the gaps; ok; be careful of the gaps, they should be realistic; ok. And, this gap as you have done in Six Sigma should have an upper specification limit and lower specification limit.

Upper control limit and lower control limit so, this is. Second is if there is a failure second point, if there is a failure, there should be a way to have a recovery. How to design the recovery system, how to design the recovery system, see how your system is automated? For example, as we give with the example of metro how the system is automated, then you design it accordingly; ok. System recovery as we gave you the example of any system in between if it gets hampered that is a problem.

But over a railways, local trains, etc., passenger trains, you have one extra platform; metro railway also has such a system in some cases you have extra platforms; ok. So, this is a way by which you design the system, take care when there is a failure and you also try to recover the system; clear. So, what we did today was basically designing the service systems, the failure and recovery; ok.

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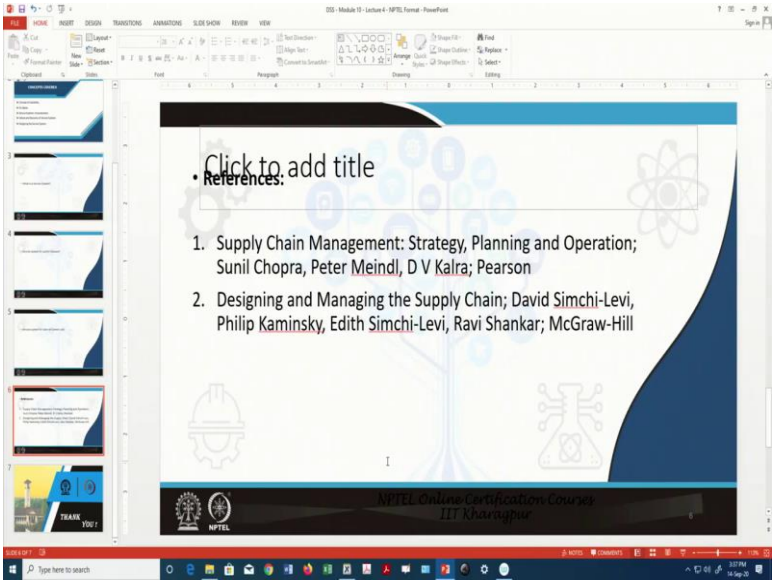

Now, these are your references; sorry; these are your references; definitely Sunil Chopra as we mentioned: Supply Chain: designing the service system, and any standard material on ‘Six Sigma’ as we have mentioned earlier also will help you; ok.

Thank you very much!