Project Management: Planning, Execution, Evaluation and Control

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Welcome to the course Project Management Planning, Execution, Evolution and Control. I am Professor Sanjeev Choudhury from Indian Institute of Technology Kharagpur. Continuing with the module 6 that is developing project plan, in this lecture we will discuss extended network techniques to represent reality. So, in this lecture we will be discussing the level of details of our activities and extended network techniques that will represent the real-life projects and all. Then we will also discuss the concepts of lags, then laddering and what is hammock activities, this we will be discussing in this lecture. To start with level of details we have talked briefly beforehand in the previous some lectures that level of details is required as per the need of the different level of the management.

It should not be too much of information that will bother the top management or it should not be too less information so that you are misguided or your focus is lost. So, we have discussed that. Now, we will be going for what is laddering. Laddering is supposing if you have a big project an activity which is sufficiently long and we have the rules that unless an activity completes the successor activities cannot start.

So, there is a finish to start rule and this rule is too restrictive for a project which is having activities which are fairly long. So, in that case what you do? You broke down the activities in segments and start the activities and the next activity can start in parallel with a gap with a gap that is called the giving a lag a few days gap you that is called the gap. So, or the lag so, and you start doing it. Suppose take the example of laying a pipeline or laying a cable line underground. So, what you do activities are three one is you dig up a trench then you lay the pipe then you refill and refill the that soil and all.

So, suppose if you are going to lay a 1-mile long pipeline. So, what you unlay what you do you segment it say one-third and all. So, you dig a trench for one-third length of that then the then after one-third is done you start laying the pipe without waiting that the entire trenching work is completed. So, you lay a pipe for one-third and the next you proceed trenching and

laying pipeline and you then you refill it. So, that way if you do this your time project completion time is compressed and this is called laddering and this technique are generally used in real life because no one will wait for your digging completion for one mile then you start lay pipe for another and then refilling and all it will take you much more timing.

So, this is called laddering the concept of laddering then the what is the concept of lag? Lag is the minimum amount of time a dependent activity can be delayed without delaying the project completion. So, lag is used lag is used generally for giving the flexibility to your network it gives you flexibility. Suppose you say I will give you the example use of lag the finish to start relationship suppose material ordering ah your work cannot start with the next activity cannot start with material order reaches. So, material ordering has two components ordering of the material will take one day, but the delivery of the material will take 19 days. So, you can you look these activities can be written as one day of ordering plus lag of 19 days for shipment and receiving of the material.

This is the and the lag is also used to finish to start and combinations thereof and lags have also generally used when you have an activities duration is fairly long then you can break the break the segments and subsequent activities can start as we saw it that is one type. Another is lag is used to introduce constraint to the activities succeeding activities start or the end. So, we will be showing it this way here it is a start to start to start relationship you give a lag and say activity m and activity n can instead of finish to start you can have start to start. Similarly, you can have finish to finish relationship say suppose here what does it say that testing cannot be completed no testing shall be cannot be completed no earlier than not earlier than four-time units have elapsed after prototype is completed. So, this is a finish to finish relationships similarly this is start to finish relationships say system documentation cannot be completed no not earlier than three-time units lag after the testing has started.

So, testing started with a lag time unit 3 system documentations to be finished this is start to start finish you are putting some constraints say this is start to start lag with a lag of 3 say we have seen the trenching the pipeline can start after 3-time units has elapsed after the trenching has started. Similarly refilling can start after 3 time units has elapsed after laying the pipeline this is start to start relationship this is combinations relationship you can have any combination say this is finish to finish and this is start to start finish to finish say debugging cannot be completed no not earlier than 4 time units 4 time units have elapsed after the coding has been completed and here debugging can start after 2 time units have elapsed after the coding has start. So, this is start to start this is finish to finish things in practical life also you will find say labelling packaging and labelling after packaging is done immediately labelling is done. So, that is finish to finish say labelling of the package is done this is package this is packaging say this is labelling the labelling can start after say immediately

after your packaging is complete and that is one. Similarly, for the road construction you have seen the road is constructed within 2 hours the marking is done sign and all marking is done.

So, these are the combination relationship. Now, we will say it say traditional sequential approach is like this no project product planning this is finish to start pro system engineering cannot start unless product planning is completed the engineering design cannot start unless system engineering is completed procurement cannot be done unless design and development is completed manufacturing and production cannot be done unless these are finish to start see the time taken is more same thing new product development you can do start to start with a lag say product planning system engineering design this all can be done simultaneously product and system engineering. Similarly, system engineering and design and development these with procurement then procurement and manufacturing production and quality assurance this can be compressed or first track first track with a start to start with a lagging. So, you see the time has the project has come down from the traditional sequential approach it would have been this much now it has compressed to this. So, this lag concept of lag also can be used for first tracking.

See this is a network using lags if you look at this network you can find say A this is the this is the early start early finish late start late finish and this is the durations and these two are the slack say A activity A then 0 is the early start duration 5 early finish is 5 and the, but the activity B starts with a lag 3. So, its early start is 3 not 0 3 then 1 is the duration early finish is 4. Similarly, with a lag 4 C starts at 8 not at 4 because it has a 4 plus 4 it has a lag 8 it is duration is 2. So, its early finish is 10. So, this early start of this is 10 16 is the duration early finish is 16.

Now We can start early start to start with a lag. So, start is 10. So, we can start with lag 2 12, but it cannot finish at 14 12 plus 2 14 because it is finishing the this has given finish to finish lag say 16 is the finish. So, with a lag it can finish only at 18. Then this can finish not at 5 is the early start, but we with duration 3 it cannot be 8 because its early finish of this with a lag 2 is the early finish of F.

So, it will be 18 plus 2 20. So, if you see this dotted lines are the are the critical path and so, critical path is A B C D then E F is say, but critical path you can see that E and this all is having this B C D is having 0 slack for both early start early finish and late start late finish, but this E and F if you see it has 0 slack for the finish for the late start late finish it has 0 slack, but the starting early start early finish it has a slack this F also has a slack. Similarly, A start early start early finish has a slack, but has a 0 slack, but early finish late finish has a slack. So, these are the called the finishing slack. So, this is the concept of using lag in a network.

Next, we will talk about hammock activities. What is a hammock activity? Hammock activities is used when you want to want to examine a part of your network, a segment of your network. Suppose, the hammock activities are constructed after the network has been built after you develop the network you want to a segment of the network say this is the segment we wanted to examine very in detail. So, say for example, it can be used for the inspection purpose, it can be used for the consultants purpose, it can be used for the look examining the indirect cost purpose and all and in hammock activities which one you this is a hammock activity you introduce for the for the entire section in that the early start of hammock activities is the early start of the first activities in that segment which you are trying to trying to study or trying to examine. So, this is 5 and you take the early finish of the last activities EF last activities early finish is 13.

So, your duration is 8 days. So, this is the hammock activities you in nutshell you use it to find out the much-detailed information in that segment of the activities it may be anything inspection consultants then the indirect cost anything it can be this is hammock activities. So, to sum it up what we have discussed now. So, we can say further to previous lecture this class discusses the extend extended network techniques that represent the reality it introduces the concept of lags and how to fast track a project and develop network using lag. It further illustrates the concept of laddering hammock activities etcetera which are widely used by the practitioners of the project management.

Ok, these are the reference book you can further go through and enhance your knowledge further on this topic. Now, I thank you all for attending this lecture.