Course Name -Project Management: Planning, Execution, Evaluation and Control

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Lecture - 23

Welcome to the course Project Management Planning, Execution, Evolution and Control. I am Professor Sanjeev Choudhary from Indian Institute of Technology Kharagpur. In continuation with the module 8 that is Scheduling Resources and Cost. In this lecture, we will be covering time faced budget and critical change project management. The concepts that will be covered in this lecture are creating a time faced budget, its need and importance and the critical change project management. To start with why do we need a time faced budget or the baseline budget.

In fact, suppose I say to you a project is of 8 months duration and it is 8 million the dollar is required for that and the the project is the funding is given like this say each month it will be allocated 1 million dollars. So, after say 5 months your owner or the senior management wants to know the status of the project how it is moving. Suppose after 5 months that the spending the expenditure were spent say 5.6 million dollar and the planned was 5 million dollars.

So, what you will infer from here similarly if the project after 5 months has has spent 4.7 million dollar. So, is the project is produced under budget or over budget in both cases what do you infer whether it has got the milestones or the planned completions. You cannot infer anything from here unless you have a physical you know the physical progress of the project. It might happen that 5.

6 after 5 months instead of 5 million dollar they have spent 5.6 million dollar. It may be over budget or they may have gone physical progress has been much more which was planned. Similarly for 4.7 million dollar after 5 months be they have not spent some have not done some work.

So, you cannot make out anything. So, what do you need a baseline budget? baseline budget which will depend on the on your progress of the project that is why that need for a time phase budget or a baseline budget which shows a standard like also to determine if the project is ahead of schedule or behind schedule or under budget or over budget you need an anchoring point. So, the time phase budget is an anchoring point a standard a

datum line against which you will measure your progress. Also, to know how much work has been accomplished for the allocated money spent the project that is the project cost baseline. How do you do that baseline? That baseline creating a time phase budget baseline you must have seen you have done this work breakdown structure.

Then you have done the organizational breakdown structure you tie both these things then different management level and all what are the who are the responsible what are the cost involved time schedule involved everything you can make out in each level. So, you can roll it up. So, what is happens creating a time phase budget line you assign each work package to one responsible person or department and deliverable. So, each work package is tied with other the organizations each level compares the plan schedule and cost with the earned value. Earned value is a weighted given budgeted cost of work performed you do it that way you are creating a time phase budget.

So, we will be solving some problems that will clear the concept of the time phase budget. So, let us solve this problem ourselves. So, what does it say? This problem says the given the time phase work packages and network complete the baseline budget form ah form for the project. So, here we can see the market this is a project markets are very simple project work breakdown structure the work package designs, work package survey, work package report these are the are the allocations of the fund. Now, this project network is given what is this project network you have to find out the this is a simple thing simple project network.

So, it is given say 0, 3.0 is the duration early finish is 3. So, here it is let us complete this this one. So, here what is happened early start of survey is 3 plus. So, finish early finish is 3 plus 6 9.

So, early finish start here is 9 plus 3 early finish is 12. So, backward pass 12 minus 3 9. So, slack is 0 then ah late finish is 9 minus 6 early ah late start is 3 slack is 0 here it is 3 3 0. So, you have found it out we have found out this. Now, you have to allocate the time phase budget say design total budget is 11.

So, how it is distributed it is already given from 1 4 5 2 because the the the design start at the 0th and it finishes by 3. Then your project network the the the the says that survey starts at day 3 and its duration is 6 it goes for up to 9. So, what is the time phase budget given 2 2 4 4 5. So, you have to do it now. So, how do we do now? it here this is 2 2 4 4 5 starts on day 3 it completes on day 9.

So, this is the budget given then the report is 3 3 2 It starts on day 9 it completed on day 12. So, report is starts on day 9 is how much 3 no this is 3 say it is 3 3 2. Now total what

is the say 3 3 2 is the 8 this is 21 is a total budget is this. So, you add it this is what 4 this is this is 5 this is 2 this is 2 2 4 4 4 5 3 3 2 cumulative is 4 plus 5 9 9 2 11 2 13 2 15 19 23 27 32 plus 3 35 38 40. So, you have seen is a simple the simple you can carry do the same thing for the other problems also this is just to give you a glimpse how it is being done.

So, now, now we will be going to this is ah going to ah another important topic that is called critical chain project management CCPM. This was championed by a Elihu Goldratt. Goldratt in his book that he has championed this because he is also the man who has propounded the theory of constraints. So, what is this critical chain project management? You know he says that the you know when we estimate the activity durations ah what we do he he says the people make it 80 to 90 certain that the task or the activities are completed within that estimated time ah estimate time. So, so instead of that he proposes to bring it down to 50 50 certainty that is the median 50 50.

Now, he points out that in spite of giving so much of 80 90 percent certainty or the safety that task will be completed on or before that estimate time project manager also at the end use some safety some buffer to keep that the project is completed within that time. So, even after all these the most of the projects gets delayed. So, what what happens that it gets delayed what are the reasons for it that he has ah has found out and proposed this. So, this is the basic question he poses that even after why projects are often behind schedule if there is an overestimation of duration of activities and safety factors added to the overall project why it is. So, he proposes these are the possible reasons one is the Parkinson's law.

So, Parkinson's law says we know that time fills the work work fills the available time. So, why to hurry yourself when the the time is available for you to complete the task tomorrow or the day after tomorrow. So, do not hurry for that that is the Parkinson’s law self then the self protection the everyone keeps a safety net. So, in the sense like if your project manager asks you to estimate the time will be required for this task to be done is 7 days. Now, if a person finishes in 5 days what happens next time the similar task is given to you project manager will keep that expected finishing time is 5 days.

So, it comes down. So, if if you do it early next time, you’re that duration should be estimated less. So, similarly there are peer pressures if you give it first peer pressures will be there that not to not to finish it first. So, that the standards again tighten further. So, these are the self protection everyone does it everyone keeps a safety margin. Third is the dropped batten.

Now, Goldratt he has metaphor this project with a relay race. In relay race what happens

one runner he runs first gains the advantage with the time he finishes early and pass the button to the next runner. If the next runner is not prepared then the time advantage what the first runner has got is neutralized or the compromise there is no competitive gain you get. Similar in a project one if a one group or one person does the task first then the next group is not ready to start it. It may happen due to poor communications or the resource inflexibility or they may not be having the resources.

So, gain in one task or one sections or segments of the task does not pass it on to the next segment pass it on may in the sense like they cannot take the advantage of it because they are not simply prepared or they are not adequately having resource. So, these are called the dropped batten. Then next is the excessive multitasking like we all know in a multi project environment every company works under with a resource constraint. So, the people thus as I gave you in the last lecture say design engineers and all or the accountant, he has to move from one project to another project and that creates the splitting of the activities and it extends the durations of the project. Then the resource bottleneck, resource bottleneck is that like a project the organizations have different projects and suppose an equipment has to be shared with other projects.

So, that it becomes a bottleneck for one for the project. So, it may happen and it is a in reality. Then student syndrome, the student syndrome is like students have a tendency to submit the assignment given to them at the last moment because if the time is available, they always procrastinate and complete it at the very last moment. Similarly, the project or the activity, activity if it is having a slack or the time then they generally tendency is generally to do at the last hour. So, but when you are doing the task and all you do not perceive the difficulties or the obstacles that may come in.

So, once that may come in then your project if you started at the late at the last moment project durations may slip. So, this is the student syndrome. So, these are some reasons for that projects are being led. Now, Goldratt says this CCPM that critical change project management. what is the solution? He solution he suggest that instead of 80 to 90 percent certainty for the estimates you make it a median point like 50 50 percent estimate like there are 50 percent chance of you succeed 50 percent chance you are not succeeding.

So, what happens if you do that your project duration comes down substantially say 32 by that 30 to 40 percent it comes down and each activities it comes down this way then the project durations also comes down nearly 30 to 40 percent. So, for that what happens for that they say the project buffer he proposes instead of giving that you measure it with 50 50 percent certainty then give a project buffer what is this project buffer? Project buffer is given to the critical activities I will come to it a bit late before that you just go

through this table that if you this is the original estimate durations the say A B C D E these activities the original distribution with 80 90 percent certainty is 10 days 6 days is and it will total is 40 days. Now duration based on 50 percent probability it will become 5 days 2 days and it will become say 18 days from 40 days it is the 5 it should be 18 days, but there is no safety here. So, that if something goes wrong the critical path activities are also uncertain if something goes wrong your project will be delayed. So, what happens you keep a project buffer project buffer is the time that the safety margin you keep it for the for the critical activities you give it like it shows like this if you see it say this is the reduction in project duration after degradation say this is the one that I told you say step 1 activity 1 2 3 4.

So, your project this is the original estimation 80 to 90 percent that certainty estimation. Now you do the that is the 40 days it took now you make it the 50 50 percent estimation say it has come down to this much more than is the 50 percent. Now it is said this is the now you give it this 1 2 3 4 you put it at the with this 1 2 3 4 it comes that you give a project buffer project buffer is nothing, but a buffer given to the critical activities and what is project buffer you generally gave 50 percent of the aggregate safety aggregate safety is what you get this project buffer is the aggregate safety for each activity you brought it down from 80 to 90 percent certainty estimate to 50 50 percent estimate. So, the project buffers 50 percent you give the total safety is total aggregate safety is 50 percent you give the project buffer. So, this is nothing, but half of original original critical change that is say if it is your say 50 days minus redefined critical change suppose redefined critical change is 30 days original was 50 days.

So, the time gained is aggregate total aggregate gain is 20 days 50 minus 30 you give half of that 50 percent which means, that 10 days of the project buffer you give this is the concept of project buffer it is given to the critical activities. Now feeder buffer is given to the non-critical activities because non-critical activities when it meets the critical change, they there you put you do not give this buffer for each activity you give it the buffer as one goes at the generally towards the end it is given. So, I will show you the feeder buffer that how does it. So, here that these are the non-critical activity x non critical activity y and these are the critical activity. So, where the non-critical activity meets the critical change, you give a feeder buffer these two give a safety net margin for not affect the critical change activity.

So, these are the feeder buffers given. Now next is is resource buffer sometime you have to give some resource buffer it is nothing, but time buffer for an activity that requires scarce resources and that of the preceding activities what does it mean there are some activities which require very rare or the scarce or the limited resources and these are having high chances of occurring. So, what happen in that you give some time buffer to

this and also some activities suppose the merge activity we have talked it in the module 7 merged activity it is followed by it is predecessors are more than one activity 3 4 activities or 2 or more activities are to be completed then only the merge activity can start. So, you give a resource buffer that is the time buffer there for that will take care of it. So, these are this way what happens the Goldratt suggest if you do the 50 50 time estimate percent time estimate then give a project this safety buffer that is project buffer for critical activities feeder buffer for non critical activities and resource buffer for the activities which requires scarce resources or the merged activities this this will eliminate and he proposes that 50 50 time estimate will discourage Parkinson's law and self protection student syndrome because you would have your schedules are very tight. So, the Parkinson's law that work fills up with time chances are less students that syndrome chances are also becoming less and with a tight schedule also the self-protection becomes lesser and difficult and also this will pave the way that not pave the way that the drop button is not often takes place.

So, it will also discourage the drop button effect. So, this is the concept for the critical chain project management as propounded by Goldratt. So, this is a nutshell in the summaries to summarize today's lecture we can say that this session discusses the creation of time phase project baseline and its importance for monitoring project progress and allocation of resources. It further illustrates the critical chain approach in estimating project duration in contrast to traditional approach which has been propounded by Goldratt to avoid project time overruns and reduce completion delay. These are some of the reference books you may consult to enhance your knowledge and the subject.

Thank you very much for attending today's lecture.