Project Planning & Control

Prof. Koshy Varghese

Department of Civil Engineering

Indian Institute of Technology, Madras

Lecture – 15

Lesson - 03

Piling Activity Example, Applicability of Different methods to Estimate Activity Duration

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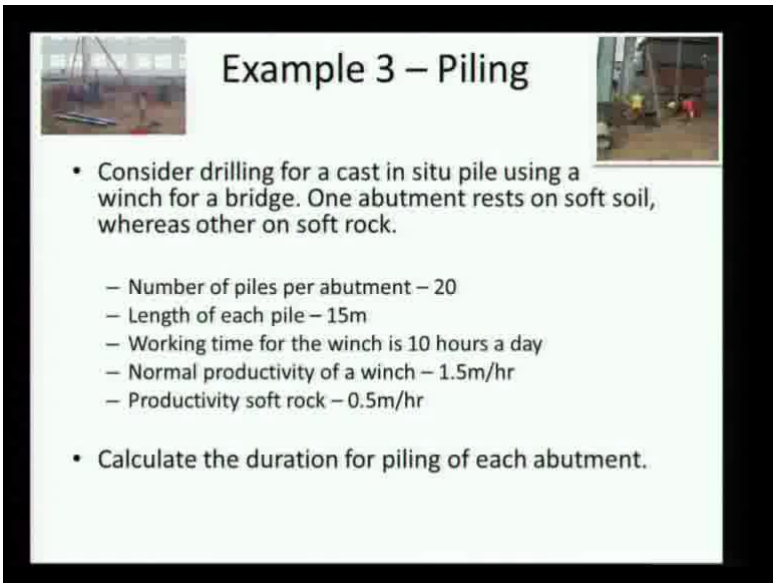

Now, I would like you to read this; it is an example in piling, and I would like you to work this out. So, what we have here is a piling activity for a bridge. On one side you have soft soil and the other side it is soft rock. In case, so now, this is yet another factor which can change your production and productivity and the number of piles per abutment is 20, length of each pile is 15 meters, the working time for the winch…. So, you can see here, it is a winch operated system, that they keep dropping the, you know where you pull it, pull the winch and then you drop the hammer, and you know grab out soil and then you start pouring the pile.

The normal productivity of a winch is 1.5 meters an hour is a progress you will make, productivity in soft rock is so much. So, you can assume that this is the productivity of soft soil. Straight forward, why do not you just do the calculation and let ((Refer Time: 01:20)). So, if you have any questions, ask me.

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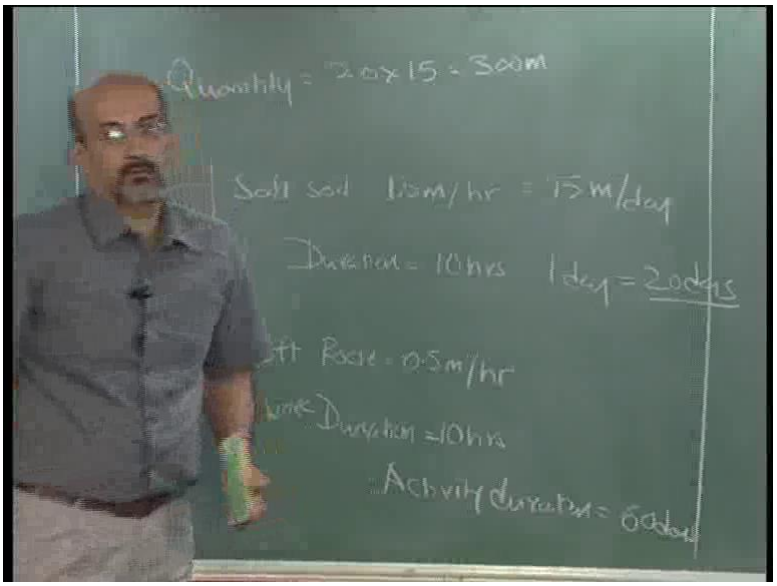

So, what is our quantity?

Student: ((Refer Time: 01:51)).

So, I can take, so look at the productivity, it is given in…

Student: per hour

What per hour?

Student: Meter per hour.

Meter per hour means…

Student: Meter per hour or of pile length per hour.

So, it makes sense to put my quantities in what.

Student: Meters

Meters, which means it is…

Student: 20 into 15

That is it. After that on your soft soil, my productivity is…

Student: 1.5 meters per hour.

It is soft soil 1.5-meter per…

Student: day

Student: per hour

Normal productivity is 1.5 meters per hour. Where did you get the day from?

Student: 15 meters into hours

((Refer Time: 02:49)) Taking that is what, I am taking, okay there is a point here,1.5 meters per hour which mean duration…

Student: 10 hours for one day

10 hours for one day, for soft rock…

Student: coming to be 50, 0.5 into 7, 57 and two days and 60 days.

Duration

Student: Duration is 1, 10 hours a day.

10 hours a day, 0.5 meters. So, you have a total of 300 meters.

Student: No, 300 minus 15 to pin out.

300 minus…

Student: 300 minus 15, because already we have…

20 piles on each side per hour length.

Student: 20

20, 20

Student: Piling for each of the abutment, so there will be two different times that will ((Refer Time: 03:53)). So, the duration for this also is 10 hours a day.

No, no, the duration is for putting 300 meters of piling.

Student: Okay, so that is okay. The notation is same.

What is the conclusion?

Student: I mean below soft soil you written it is the same duration. So, I thought it was, both the same.

Not duration, so here I am actually going 15 meters an hour or as we said, I mean 1.5, 15 meters per day. So, actually I should do 20 days.

Student: Duration is 20 days.

So, duration of this thing, so total is equal to 20 days. Here it is 65 meters, duration of…

Work duration 10 hours, activity duration, how much.

Student: 60 days

60 days. Now, in one case you have 20, the other case you have 60. So, based on some of our earlier discussion, what would you do?.

Student: I will decrease the number of working hours.

Would you decrease the number of working hours?

Student: Actually I will decrease it for soft soil, and I will increase it for soft rock.

You can do that, but let say what I mean, let say from our project perspective I would like both durations to be roughly the same.

Student: ((Refer Time: 05:29))

If I decrease, see the problem were decreased the working day duration is I am going to be paying the person the same amount for that day.

Student: Now, productivity and orders.

I will finish this on 20 days and shift the equipment to the other side, and I have two crew working. So, on 20 days these only finish one-third and I have two crew, they are working to try to bring this enough, so these are some of the options you will have when you start doing things.

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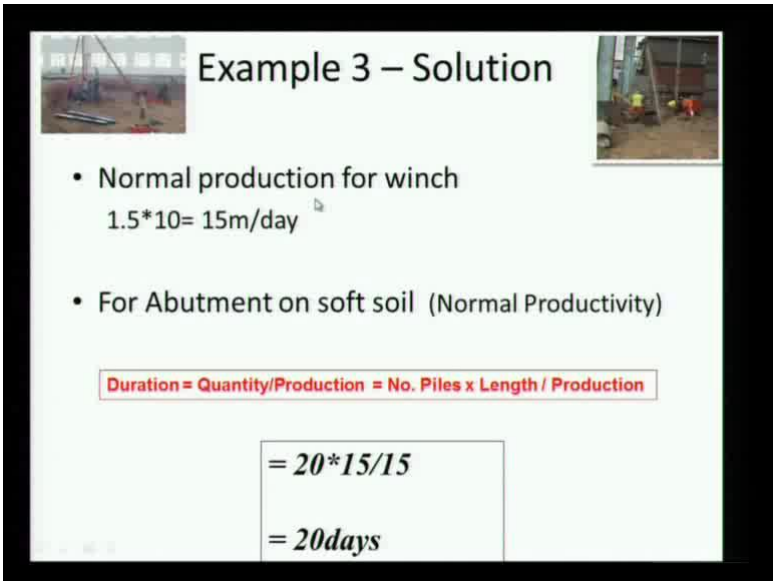

So, let us go through this, you have a… We have, this is 15… You have 15 meters per day

and going in at 20 days as we calculated. If you look at it for the soft rock, we have factored, we have taken the factored, and it comes in 60 days. So, here the other part look at is the way we have said 20 number of piles, but we are looking at productivity as… So, we would, I mean the term they would use it depending on piles diameter and length, it is dia into dia length, but here we have just taking length assuming the dia because the diameters are constant.

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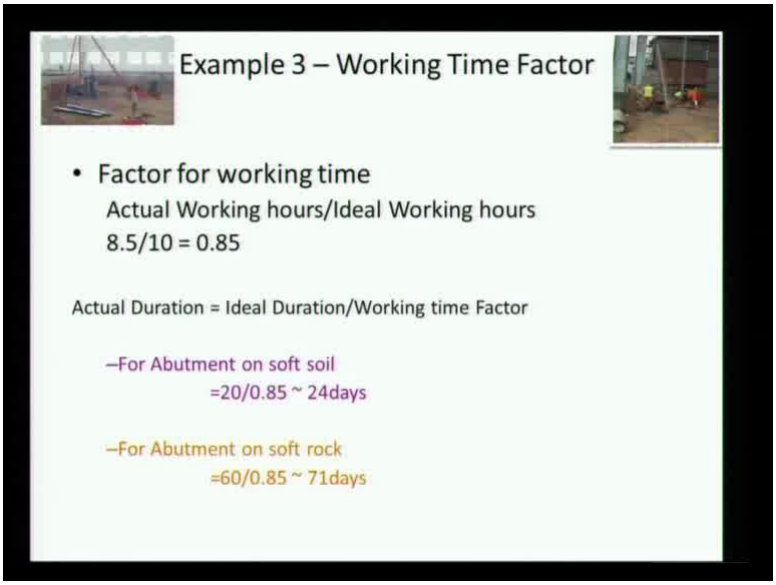

Now, we can again take this with the working time factor, and we take it again as an 8.5 instead of a 10 hour day and what was 20 now becomes, 24 days; what 16 now becomes 71 days. So, all these shows us that even something that is so simple can get a little more twisted, it starts getting more and more complicated as we get variations and uncertainties from different regions.

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Are there any questions on what we call right now parametric estimating? So, this is typically what we did here productivity; quantity is parametric estimating, the most what do you think numerically sound way to go about it and you understand the challenges behind it too. We probably at least as far as the rest of this class goes we will not look at so much as the factoring, we will mostly take duration as the value given and focus on doing other calculations with that. But, remember the uncertainty of getting this duration itself is the big question mark, which sometimes causes most of the disruption in a project schedule.

When you get back into a, now looking a duration; there are certain durations which are independent of productivity. For example, a pile load test. It has to be done, it will take a certain time independent of, you know what you do and how you do, or you know, what is happening. The same thing is curing of concrete. I can change curing based on curing compounds, but given a certain spec it will take it is time to cure. I mean, the accelerated curing is possible, but again within that aspect, that is what I have to wait for. I cannot change it on the site based on a certain; you know crew size or anything else.

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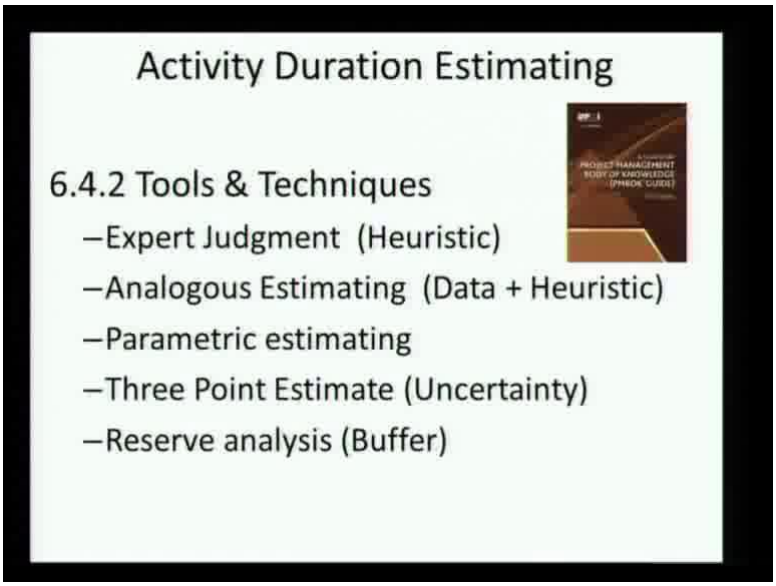

So, we are actually now coming back to the various techniques which we had shown earlier for duration estimating. You can see we had expert judgment, analogous estimating, parametric estimating, three point estimate and reserve analysis. Now, taking the first two, you know expert judgment and analogous estimating, these are very much used in construction, but the only problem is they do not have a real base in which people are using it today.

It just comes out what we called c to the points estimate and it continuous like that. There are more formal ways such as the Delphi technique, you know which you have a serious of experts when you keep asking them a question, now the question to like converge on a specific number. But, you know we have not used this into in the level which we need to yet, but that is from the scientific perspective, but from the, here heuristic perspective it is used significantly, and the main reason for this is as we discussed.

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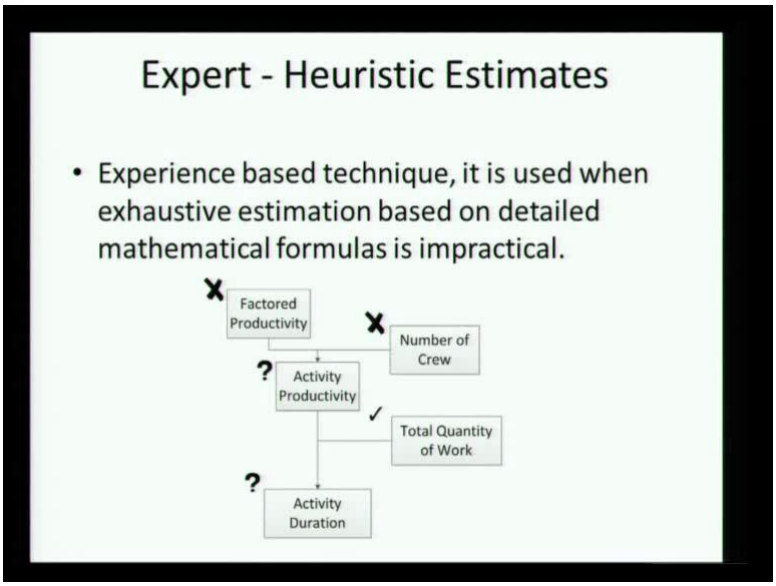

So, you know I will not have factored productivity value, I will not have a number of crew, I will not know what the number of crew available to me when I go on to a site visit. I will not know actual productivity, I only know total quantity of work, how can I actually estimate activity duration. So, all of the arithmetic we did will not be; we will not be able to do, and so we have to result to the expert of heuristic; that is one, and sometimes it just does not make sense to, you know calculate all these factors.

When there are experienced people, who can actually give you a fairly good reliable estimation. I mean we did this kind of duration estimating last week in the earlier class, how much time you need to study for a subject. So, if I take that as an example, what is… Their standard estimate will give you a, based on what.

Student: heuristic expert

Absolutely heuristic expert, if wanted to make a parametric, what could I do.

Student: ((Refer Time: 11:12)) parametric type, the number of chapter.

Number, you will start breaking down and the number of chapters, each chapter start putting times on it you know and then, factor in your lunch breaks, factor in this, factor in that, but sometimes the effort of making that estimate is more than you know the number that comes you. So, you will say I am just going to say half a day, and that is good enough. So, that is the reason the experts estimates were used and it is very practical, and if it is used correctly, it is something that is very valid.

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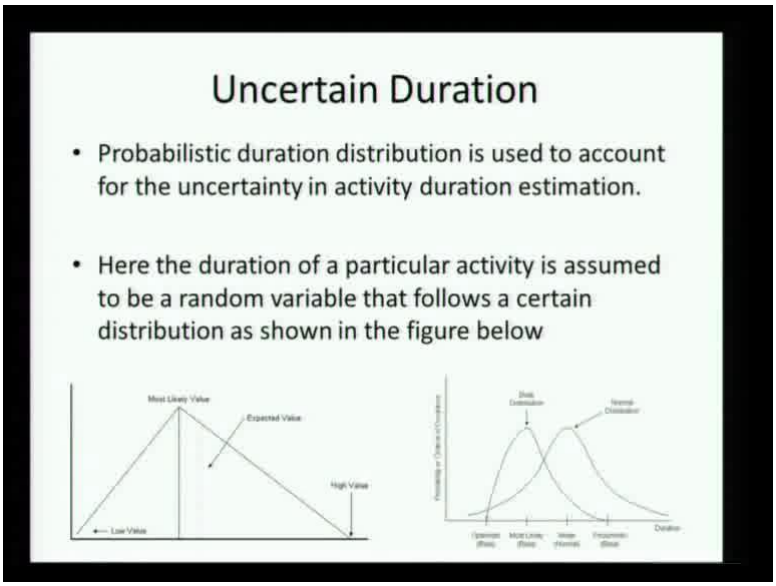

When we, another fact we talked about uncertainty, you know duration three point estimate, so this is a certainly more advance. We know there is a lot of duration, I mean all the durations we talk about are come up with uncertainty, and we have to start using probabilistic distributions, and we have options. We can, the simple option is a three point estimate, which says again this is an expert judgment, but not giving a single value; that giving a three value saying, you we can call it the lowest more likely highest are you know optimistic most likely pessimistic.

So, you can have values like this, which are based on expert judgment or if you really have data, you can go ahead and start plotting distributions of your duration and if you start plotting distributions; obviously, you get capturing much more information than an average. So, far we have talked about the only average productivity, average and everything is based on average. Here we have a factored average, average for this kind of work in this height; that is average on that, and that is how we are factoring it from on a basic.

Now, we start talking about more characterizing it in terms of uncertainties. So, we will see both of this kind of duration distributions, one for PERT and one for Montecarlo, later in the course. We will not discuss very much about you know the derivation of the distributional things that we learn how to use it at that stage. So, if I go back to the techniques ((Refer Time: 13:32)) you know we have actually covered all of these techniques very briefly; that is expert judgment, analogous and three point estimate.

We have covered parametric estimate in you know more detail because it is what is structured

and probably easier to use it if those numbers are available. The reserve analysis is again like I said a buffering technique, which is mostly based on expert judgment. So, I am not covering that in detail, like I said there is very little material available on how one technically goes about the reserve analysis.

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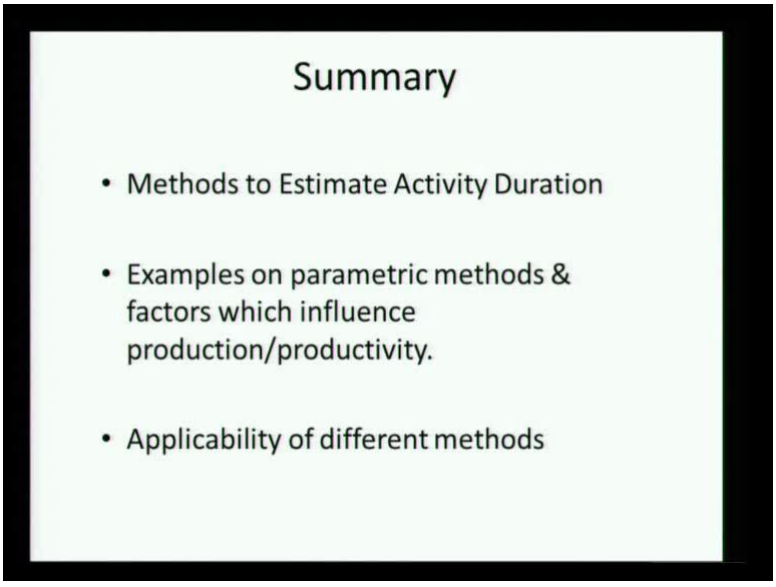

And to summarize, we have covered all of these methods. We talked about the duration; we have talked about the way to estimate; we discussed in detail the parametric methods and the applicability of different methods. If there are questions, I will take. So, this is an important foundation to the whole planning issue, but a lot of times not given appropriate time and we will just go with values, which then kind of squeeze the whole thing and sometimes people actually work backward this.

We say this is the duration we want and without actually going into resources or anything, we start plugging in the numbers which are expected without planning the resources or the productivity and when they actually get on to the site and try to meet that duration which they had assumed, they find they cannot, so very important estimate which drives the whole project management. Any questions?

Thank you.