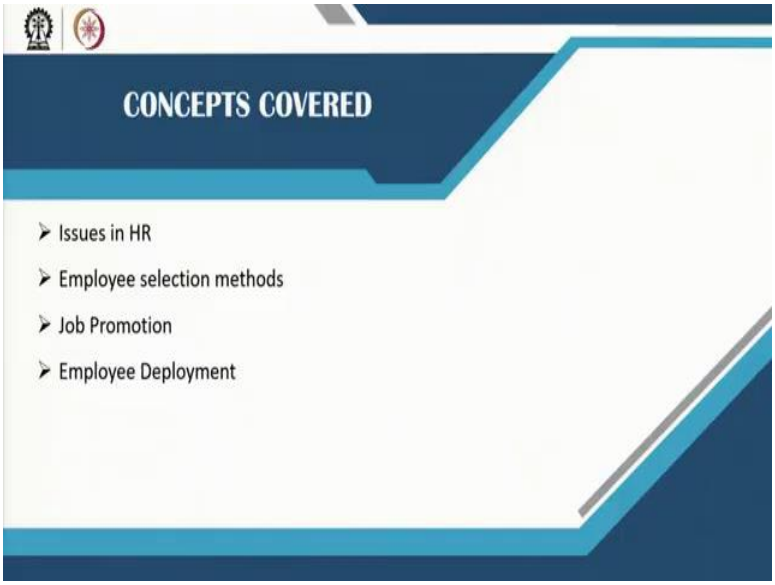
Decision Support System for Managers
Prof. Anupam Ghosh
Vinod Gupta School of Management
Indian Institute of Technology, Kharagpur

Module - 05
Lecture – 28
Employee Selection, Promotion and Deployment Methods- Rating & Ranking Method, Clustering

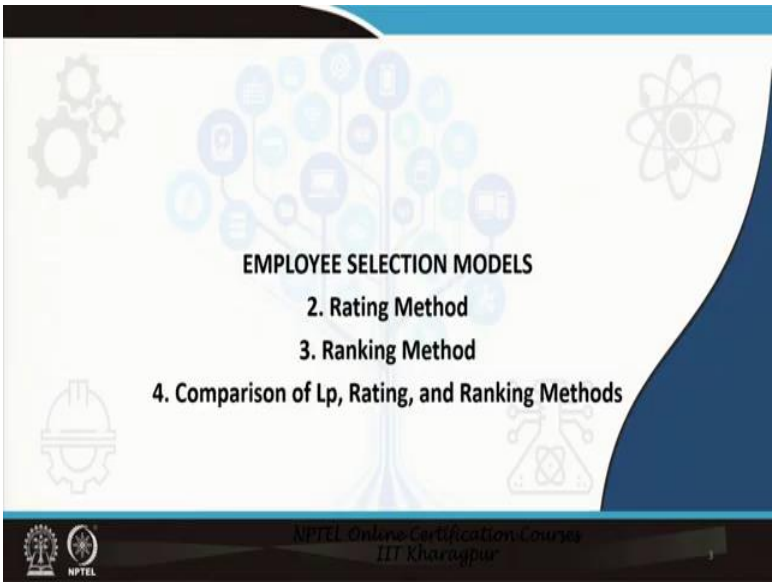
Hello, and welcome to "Decision Support Systems for Managers"! We are into module 5, 'decision support system for HR managers' and lecture 3 that is 'employee selection, promotion and deployment methods - rating and ranking method and clustering'; ok.

(Refer Slide Time: 00:34)



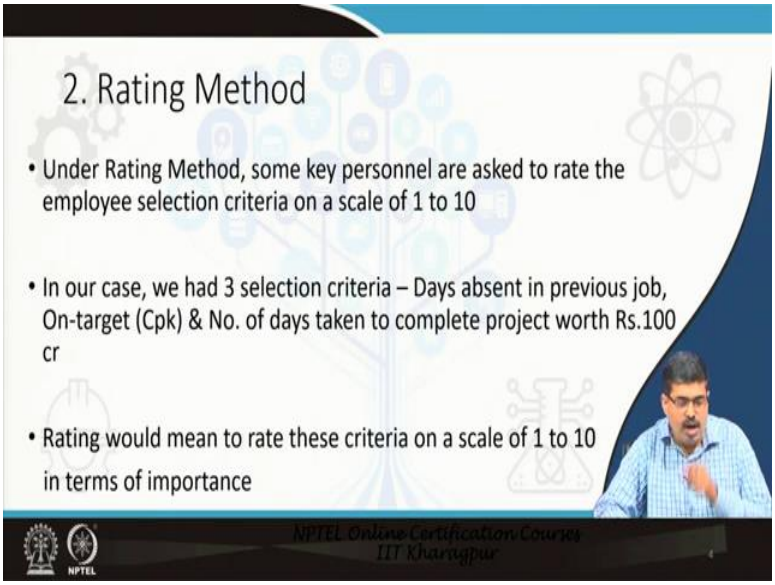
Now, in the previous lecture, we have told you the we have shown you how to do the Lp method of supplier is employee selection ok. This Lp method is extensively used for multi criteria decision making ok. Now, we have covered this issues in HR and we are taking employee selection, job promotion and employee deployment all together; ok.

(Refer Slide Time: 00:55)



Today we will do, rating, ranking and also clustering and comparison of rating, ranking for the time being later on we will do clustering; ok.

(Refer Slide Time: 01:04)

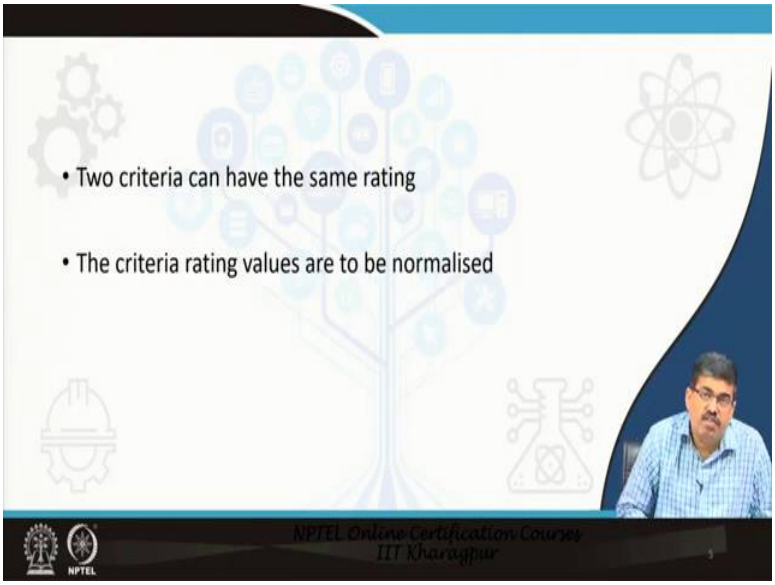


Under rating method remember. What we did for LP? We had 3 criteria. Now, under rating method some key personnel are asked to rate the employee selection criteria, on a scale of 1 to 10 in our case, we are 3 selection criteria; days absent in previous job on target. And number of days taken to complete project worth rupees 100 crores; ok.

Rating would mean to rate these criteria on a scale of 1 to 10 in terms of importance that means, we have 3 criteria. Now, for an organization they might say, that number of days taken to complete project 100 crore that is very important and they give it 7 on a scale of 1 to 10. Days absent does not matter work over fine, never be how many days absent you want you be absent so, days absent not important. So, scale of 1 to 10, they give a rating of 3 and on target very important. So, they will give it 5.

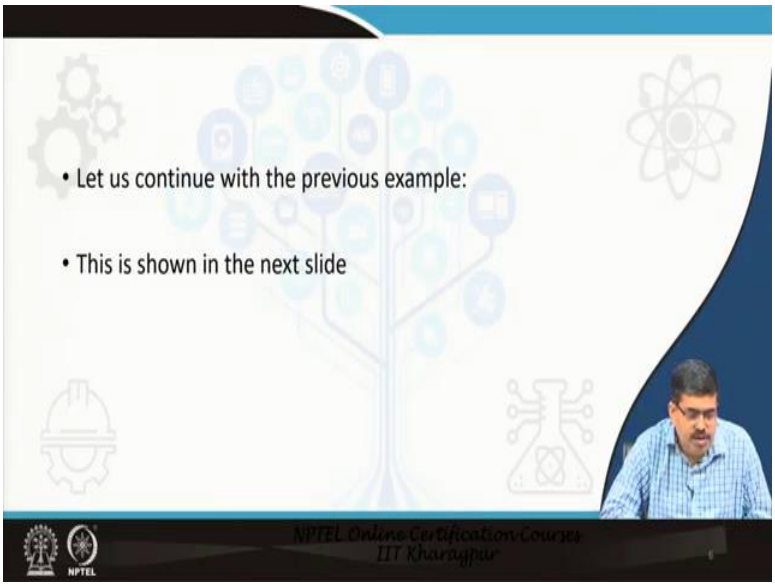
So, 3 5 and 10 they can 3 5 and 7, they can give; ok. So, this is rating method. What is the difference? In Lp method we learned that the weights were equal means. So, as to say everyone is given equal importance, but here we are seeing that they are given unequal importance so, under unequal importance. What should we do? Ok.

(Refer Slide Time: 02:25)



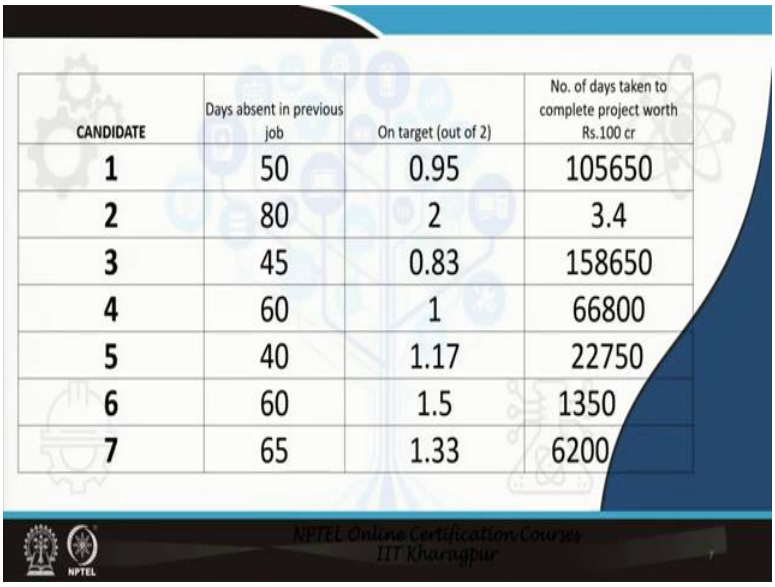
Two criteria can have the same ratings. So, 1 rating is 7 another rating is 7 that can also happen ok. The criteria rating values are to be normalized just like we normalize the previous tables. So, similarly here also, we need to normalize; ok.

(Refer Slide Time: 02:43)



Let us continue with the previous example this is shown in the next slide; ok.

(Refer Slide Time: 02:49)



CANDIDATE	Days absent in previous job	On target (out of 2)	No. of days taken to complete project worth Rs.100 cr
1	50	0.95	105650
2	80	2	3.4
3	45	0.83	158650
4	60	1	66800
5	40	1.17	22750
6	60	1.5	1350
7	65	1.33	6200

This was the original criteria; ok. This was the original criteria with which we started our employee selection; right.

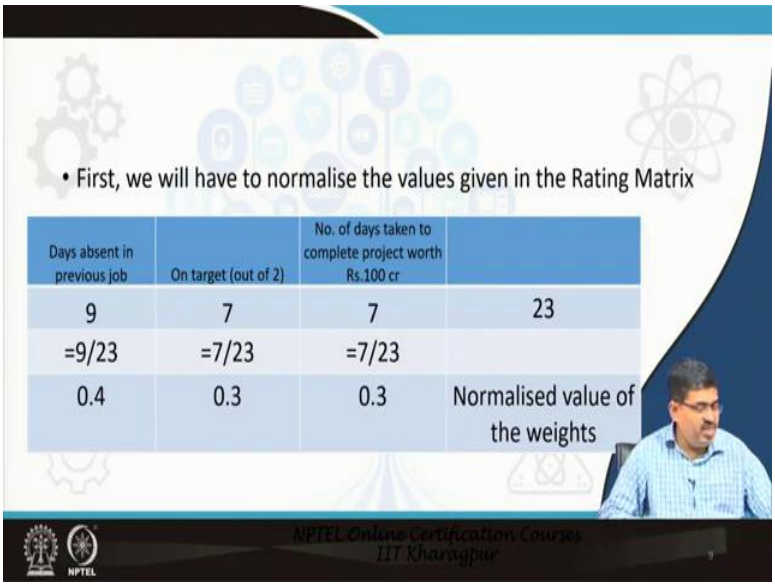
(Refer Slide Time: 03:00)

Now, the criteria ratings are project 100 crore ok. So, this were my criteria it is just one column was shifted; ok.

So, the criteria ratings are days absent in previous job 9 on target out of 2, this criteria they have given 7 and project also they have said no that is also equally important that is also 7. So, see the difference in the earlier model candidates were asked you give. What you are doing? What is it been your previous record? This is this table.

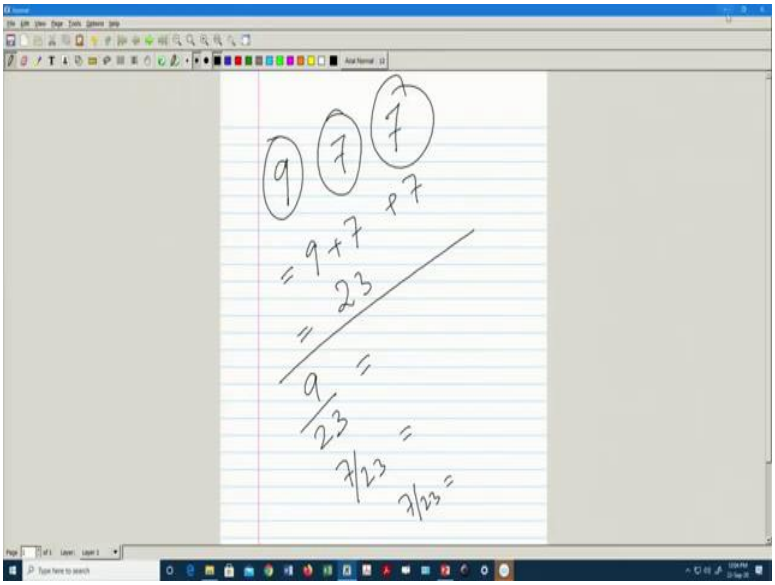
Now, the office says this is the difference, this is the table. Now, the office says the table is fine. The information that they have given is fine. But, then you tell that these factors have different importances rating; ok; these are the ratings that are there. Now, you do something now you will say very simple, just multiply just like weight actually, it is very simple only; ok.

(Refer Slide Time: 04:02)



So, what you do is? You add up this 3 9 7 7 ok. I will just show you, I will just show you; yeah.

(Refer Slide Time: 04:14)



So, your rating was 9 7 and 7; ok. So, what you do? 9 plus 7 plus 7 14 23. So, what is your normalized score? 9 by 23; ok. So, this is basically your normalized score; ok, clear; this is what we will show you now; ok. So, this is the normalized score 9 by 23 is 0.4 7 by 23 0.3 and 7 by 23 0.3. So, normalized value of the weights; ok.

(Refer Slide Time: 05:00)

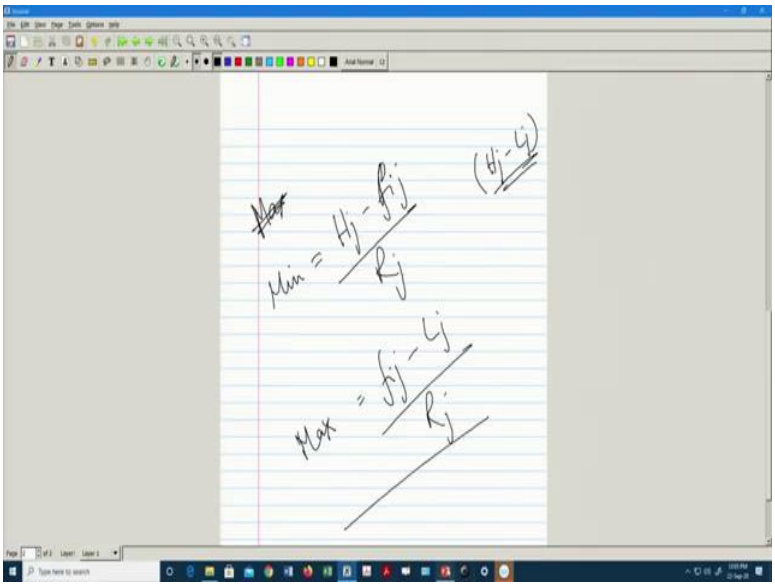
After this what will happen? Normalize the candidate score as per Lp method applying max and min criteria, just like we did in the previous week ok. In previous lecture normalize the candidate scores as per Lp method applying max and main criteria; right; ok.

(Refer Slide Time: 05:18)

	MIN	MAX	MIN
CANDIDATE	Days absent in previous job	On target (out of 2)	No. of days taken to complete project worth Rs.100 cr
1	0.75	0.10	0.33
2	0.00	1.00	1.00
3	0.88	0.00	0.00
4	0.50	0.15	0.58
5	1.00	0.29	0.86
6	0.50	0.57	0.99
7	0.38	0.43	0.96

We have normalized; normalized normalization formula you remember right, normalization formula we had given. What was the formula?

(Refer Slide Time: 05:29)



Formula was for; ok. Let us do the min formula first min formula H j minus f i j by R j. R j means what? High minus low right that is the range, and max criteria was sorry ok. So, this was my criteria; ok.

So, we apply the same formula and we and we get this normalized table; ok. You apply the same formula and get this normalized table; ok.

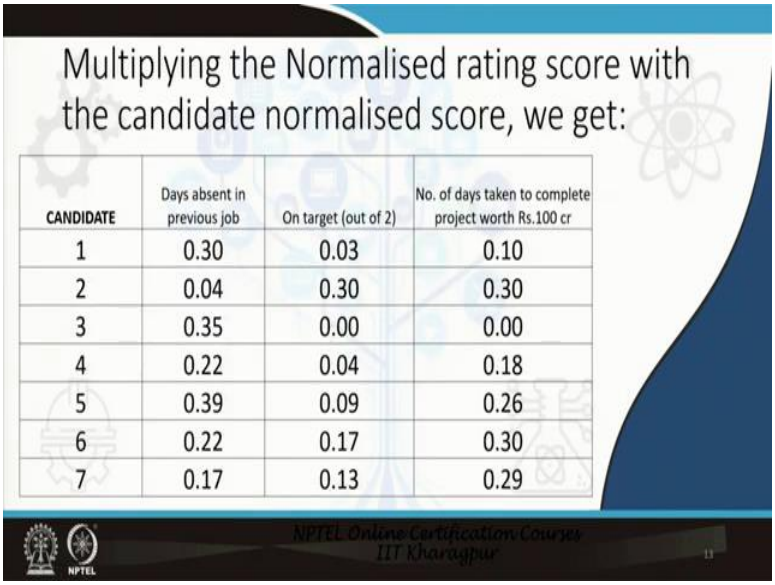
(Refer Slide Time: 06:19)

RATING	9	7	7
NORMALISED SCORE	0.40	0.30	0.30
CANDIDATE	Days absent in previous job	On target (out of 2)	No. of days taken to complete project worth Rs.100 cr
1	0.78	0.10	0.33
2	0.11	1.00	1.00
3	0.89	0.00	0.00
4	0.56	0.15	0.58
5	1.00	0.29	0.86
6	0.56	0.57	0.99
7	0.44	0.43	0.96

Now, you see on top in red on top in red here, here on top in red 0.4 0.3 0.3. This is the normalized score for the ratings. So, what you do now is? Just this normalized score for

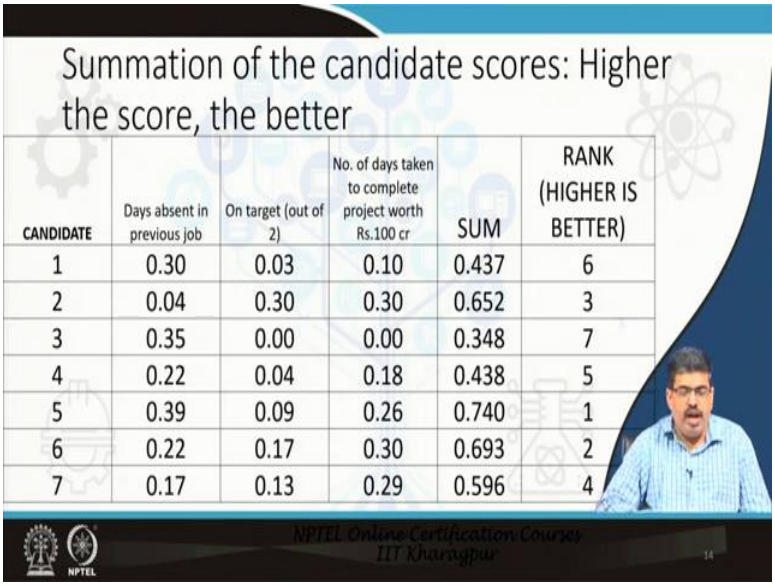
this rating 0.4 just multiply this, everything multiplied by this, 0.3 everything multiply 0.3 everything multiply nothing else.

(Refer Slide Time: 06:44)



So, multiplying the normalized rating score with the candidate normalized score, we get this; ok.

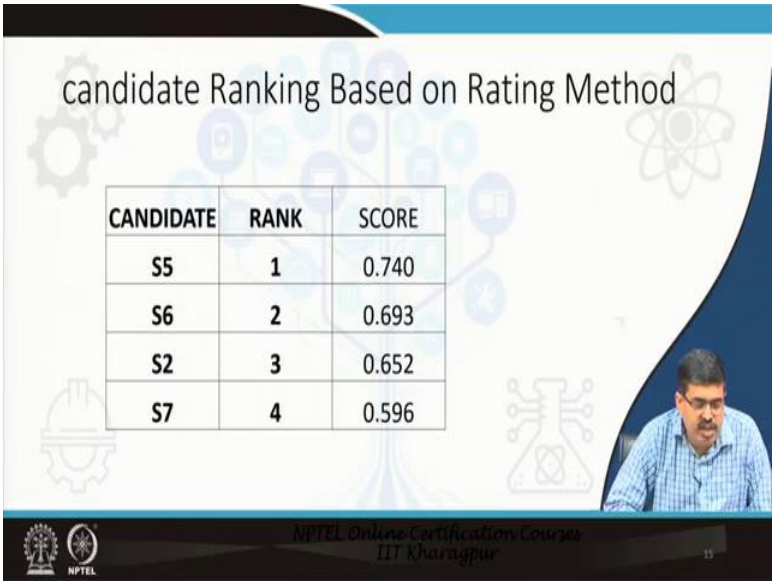
(Refer Slide Time: 06:56)



Summation of the candidate; score higher the score the better, as simple as that you sum it higher the score it is better. Earlier one was lowers the score it is better. Because, what was the idea? The idea was, this is my ideal value.

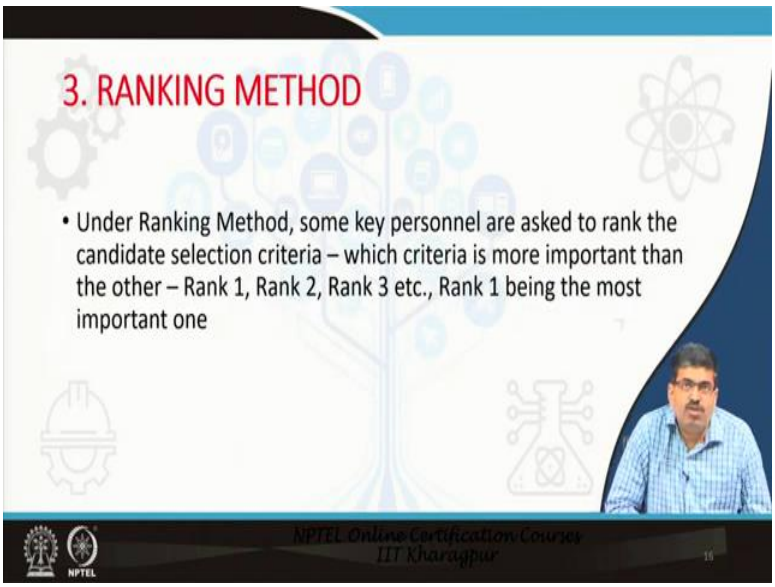
How far you are from the ideal value, that is what we were measuring and the low. And the nearest you are to the ideal value, the better and the nearest means the lowest value. But here, you have already given weightage giving more preferences more rating. So, what is happening here? Higher the score higher the rating better; ok; the summation of the candidate score higher the score the better; ok.

(Refer Slide Time: 07:37)



So, candidate ranking based on rating method 5 6 2 7 has it changed, we will see 5 6 2 7; ok.

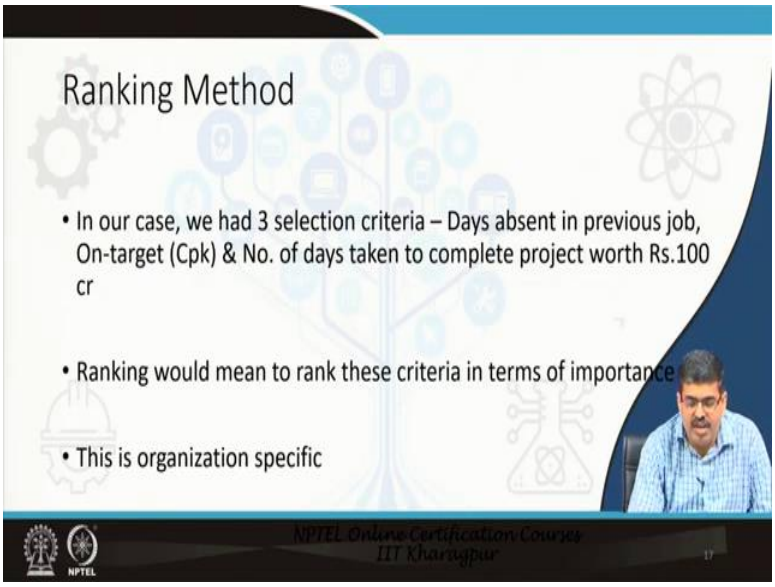
(Refer Slide Time: 07:47)



Let us go to ranking method; ok. Under ranking method some key personnel are asked to rank the candidate selection criteria, which criteria is more important than the other rank 1 2 3 etcetera. Rank 1 being the most important I am repeating again.

Under ranking method the same some key personnel are asked to rank the candidate selection criteria, which criteria is more important than the other. Rank 1, rank 2, rank 3 etcetera rank 1 being the most important one; ok.

(Refer Slide Time: 08:22)

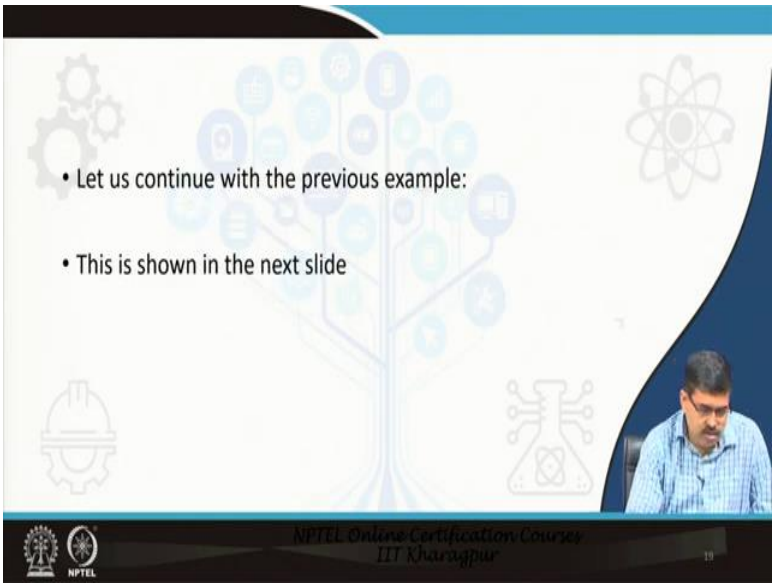


In our case we had 3 selection criteria days, absent on target number of days taken to complete project worth rupees 100 crore. Ranking would mean, to rank this criteria in terms of importance. This is organization specific remember organization specific.

(Refer Slide Time: 08:36)

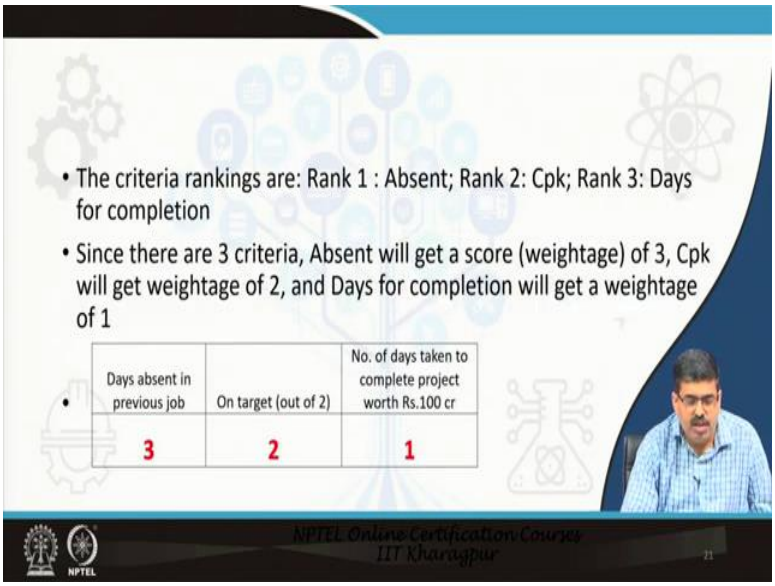
Now, two criteria may have the same rank if the organization feels that they are equally important. So, there is no clash as such, the criteria ranking values are to be normalized; ok.

(Refer Slide Time: 08:47)



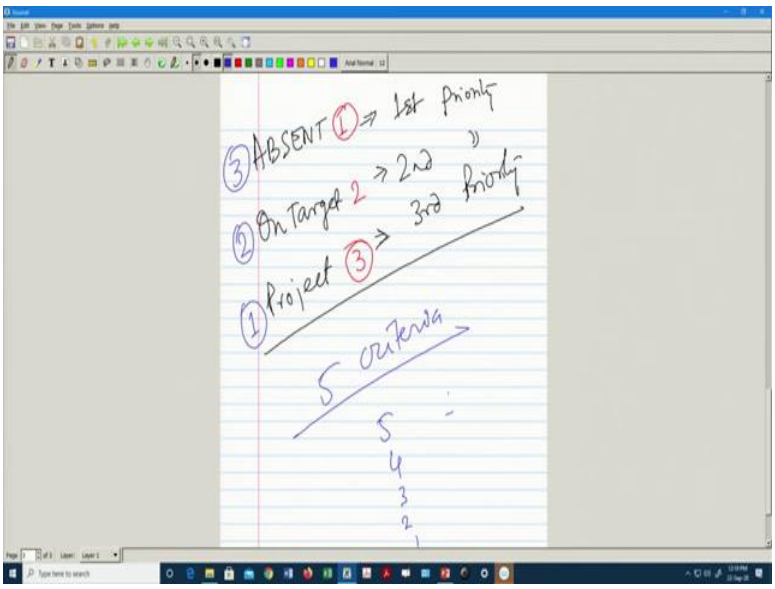
Let us continue with the previous example this is shown in the next slide; ok; same example; yeah.

(Refer Slide Time: 08:59)



Now, the criteria rankings are rank 1 absenteeism is rank 1 second one is rank 2 third one is days of completion is rank 3. Since there are 3 criteria absent will get us weightage of 3 is rank 1 weightage of 3 Cpk will be 2 and days of completion will get a weightage of 1 I will explain this.

(Refer Slide Time: 09:26)

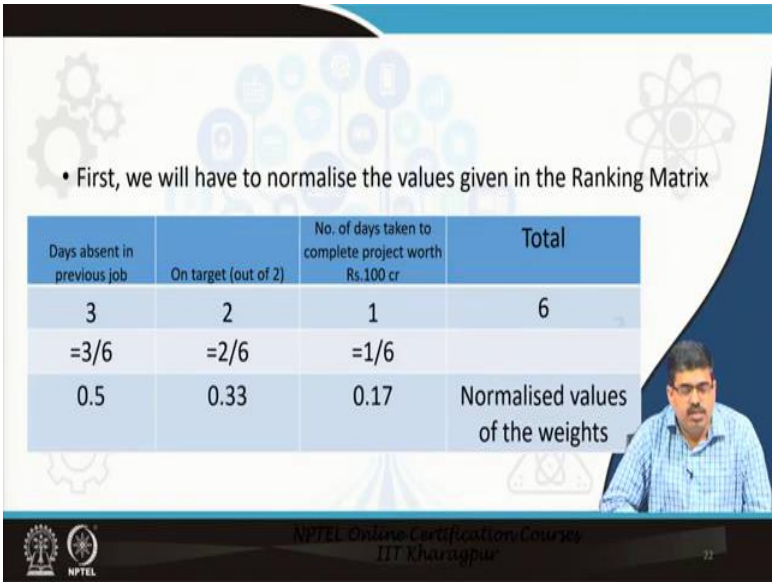


What are we doing? We have 3 criteria, we have 3 criteria right. Criteria was absent it is the 1st priority, then is your on target 2nd priority. And then project is 3rd priority ok. Absent 1st priority on target 2nd priority project is 3rd priority done.

Now, so 1st, 2nd, 3rd so, when you are when you are giving a score. If I give absent as a score of 1, if i give absent as a score of 1 this has to project as 3, then there is a problem nah because, absent will now get less weightage project will get more weightage. So, it should be reversed. So, absent should get 3 on target 2 and project should get 1 agreed. If there were 3 2 1.

If there were let us say 5 criteria. Then what will be this scores now? 5, 4, 3, 2, 1 ok. So, this is the basic difference; clear.

(Refer Slide Time: 10:49)



Then we again normalize 3 2 1 total is 6 so, 3 by 6, 2 by 6 and 1 by 6. So, normalized value of the weights; ok.

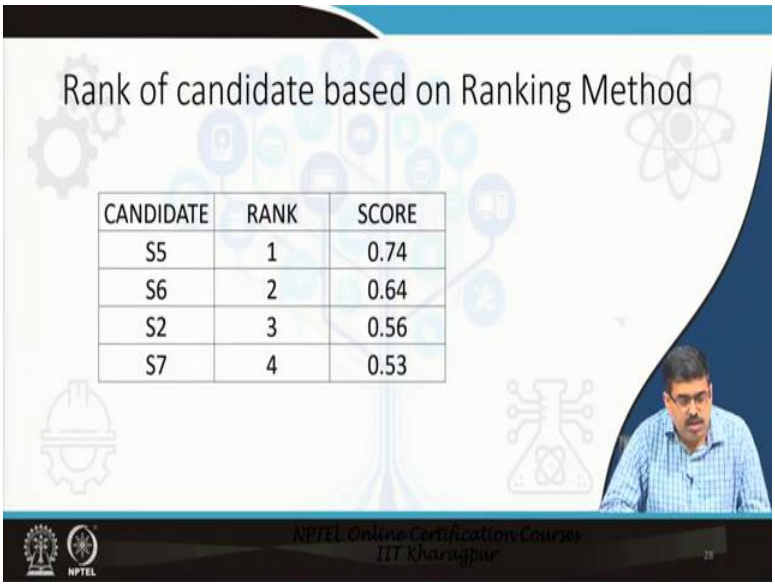
(Refer Slide Time: 11:02)

Normalize the candidate scores as per Lp method applying max and min criteria ok. So, normalize we have already done it. So, we are not going to do again because, you already have the table nah why should we do again; ok.

So, now, the normalized score we got 0.5 0.33 0.17 just multiply ok. Normalized score 0.5 into 0.78 ok, just multiply this entire column same principle no difference, only thing is only thing is the first part is different nothing else.

So, now, we get a total score after multiplication; ok, get a total score after multiplication. Summation of the candidate scores higher the score the better; ok, and then we sum rank higher the higher the score this is different from Lp; ok. That 1 one difference right. So, we get the rank; right. So, here who is the first rank supplier a candidate 5; ok.

(Refer Slide Time: 12:07)



So, rank of candidates based on ranking method S 5, 6 2 and 7 is rank 1 2 3 4 5 6 2 and 7; ok. Now, the question is we have learnt 3 methods; ok, we have learnt three methods Lp rating and ranking the issue is whether are they same are these rankings same, can it be same are they saying what will happen if they are not same. So, all these questions will come to us; ok.

(Refer Slide Time: 12:42)

[FL] Since just one; since a count is involved, ranking method is also sometimes referred to as Borda count method.

(Refer Slide Time: 12:49)

So, this is the summary as I was saying, Lp method the candidates rank 1 2 3 4 was 6 5 7 2 rating method 5 6 2 7 changed, ranking method 5 6 2 7. So, you see rating and ranking gave similar results, but Lp gave different results. Why? You all know because the weights was different right, the weights were different first one gave equal weightage second one had different weights.

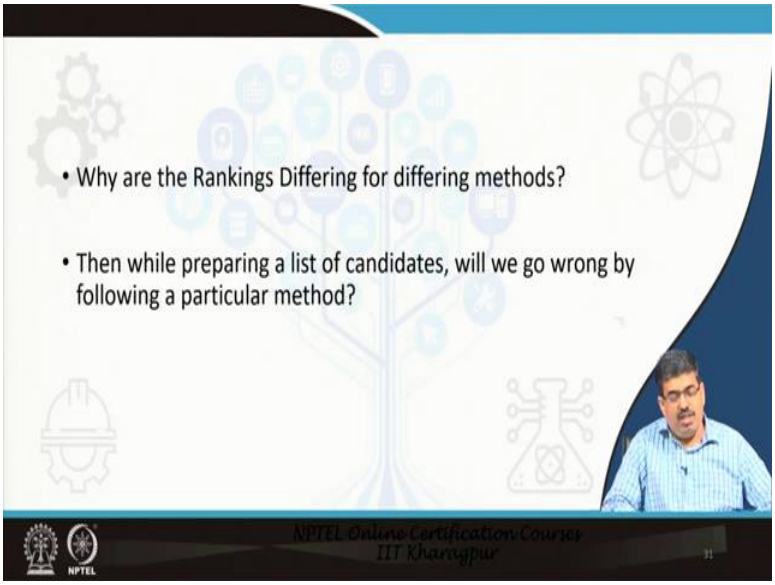
Now, the question is; see look at this table very-very carefully; I will stop here for a minute; look at this table very carefully; this is my candidate selection; ok; can I use the same table for promotion, also employee promotion? I can select; ok. I can select the same table for employee promotion also clear, select the same table; right.

Now, see for promotion, if you can do such a table employees get very employees are there, they are getting a clear picture of where they stand. Why another employee was bypassing him to get a promotion now.

Now, I see only problem here is Lp method is giving a bit different result the group remains same, but the results differ. So, if only one person is going abroad employee deployment, this third point that we are saying employee deployment. If one person is selected for going abroad, if you are following Lp method it is 6. If you are following the rating and ranking method is employee 5. So, that creates the problem; ok.

So, the question is which method is appropriate which method is not, see answer is very ok.

(Refer Slide Time: 15:05)

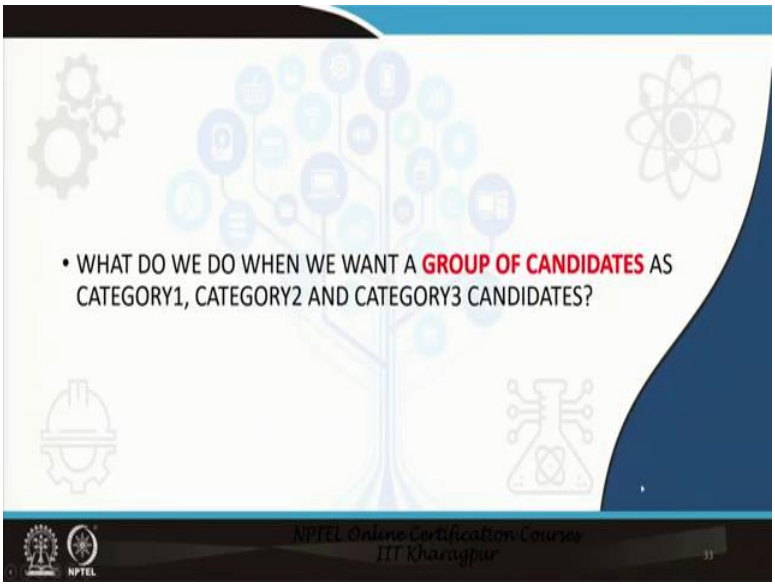


Let us go. Why are the rankings different? Then, while preparing a list of candidates will we go wrong for following a particular method? This was the question, see the answer is very clear.

The reasons why this three methods are used are different, when we have a rating scale. We have to use a rating method, when we have when we know that they can be ranked, we have to use ranking method. When we know that all have equal weightage, we can use Lp method; ok.

So, they are not one over the other, they are basically for different situations ok, they are basically for different situations clear. So, there is no overlap as such there is no clash as such no ambiguity also. It is just one method is for one particular set of situations, another method is for another particular set of situations; ok.

(Refer Slide Time: 16:05)



What do you do? When you want a group of candidates as category 1, category 2 and category 3 candidates ok. What do you mean by that group of candidates? Say a company has got a project, very-very high value project.

Now, immediately you need to form teams and then, you have to decide which team should be given that project; ok. So, there are sometimes there are already a specific team who works on certain things. So, you have to find out which team can work on it.

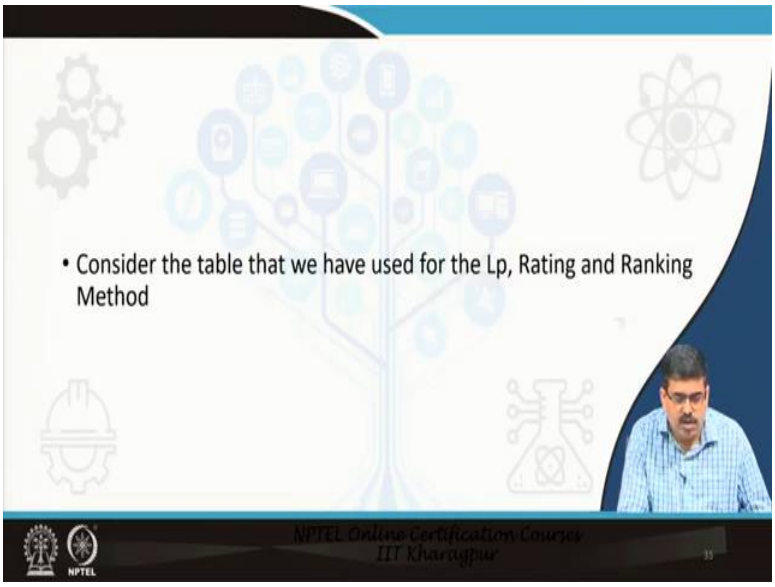
Again, if you do not give to a particular team give it to another team that team gets very unhappy. So, there should be some method ok. So, what we are saying? There should be some method in selecting the teams also; right; ok.

What do you do when we want a group of candidates as category 1 category 2 and category 3 candidates ok? Good better best, good better best ok. So, what do you do team not individual ok? Because, individuals high low high low together makes a team; ok.

(Refer Slide Time: 17:17)

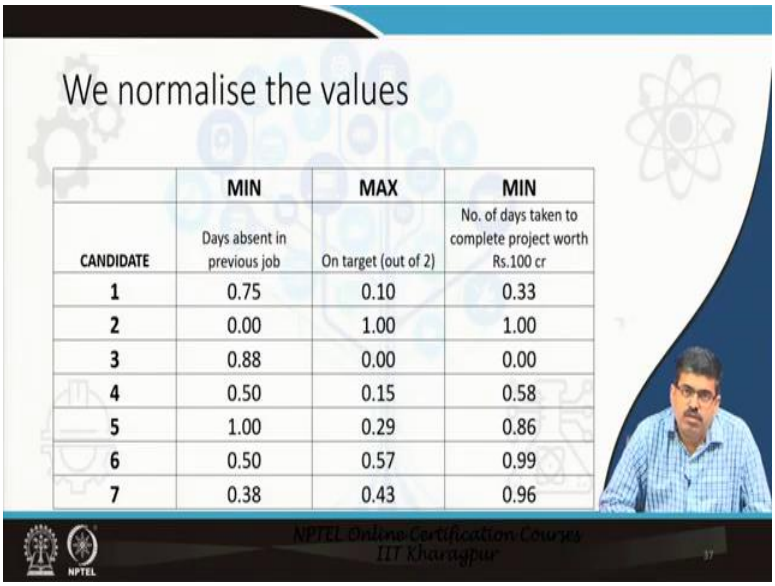
We will use clustering method.

(Refer Slide Time: 17:20)



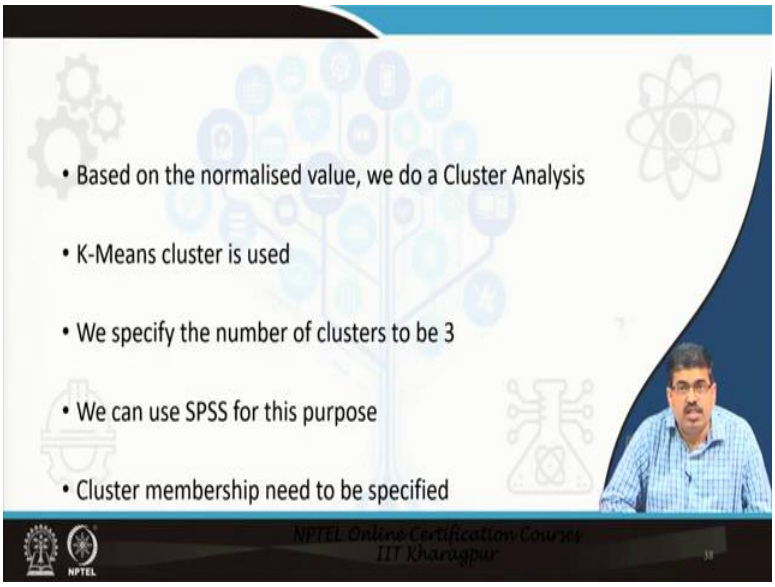
Consider the table that we have used for Lp rating and ranking method; ok; same table; ok; we are using this.

(Refer Slide Time: 17:33)



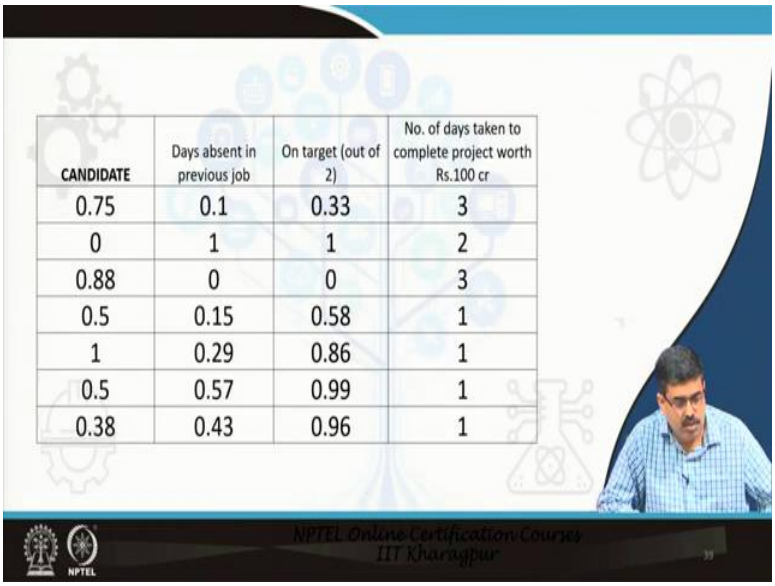
We normalize the values as usual using the same formula, max and min formulas; ok.

(Refer Slide Time: 17:43)



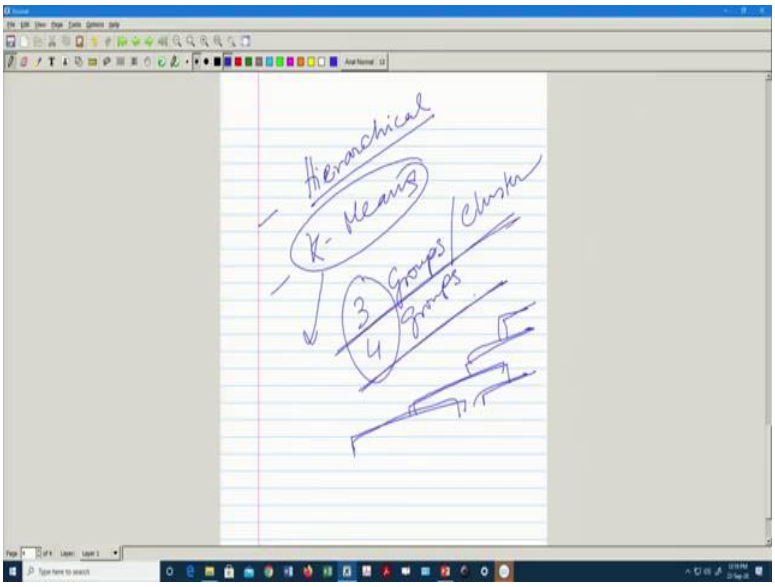
based on the normalized value, we do a cluster analysis. What cluster analysis? We do K means clustering. We specify the number of clusters to be 3, we can use SPSS for this purpose and cluster membership need to be specified; yeah; ok.

(Refer Slide Time: 18:02)



Now, I will show you how this is done; ok.

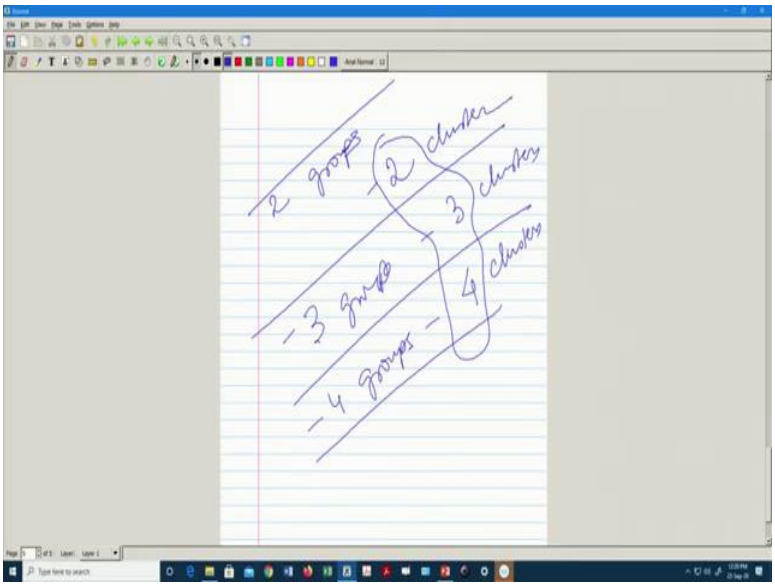
(Refer Slide Time: 18:22)



What is happening is clustering there are different ways, the different methods? Hierarchical clustering and K means clustering. Hierarchical clustering basically goes by this ok, in this way it moves.

K means clustering basically says you tell that I want 3 groups, or I want 4 groups. Basically I want this cluster ok. So, here basically in hierarchical, they converge to 1 cluster and here, it is I only define. How many clusters I want?

(Refer Slide Time: 19:15)

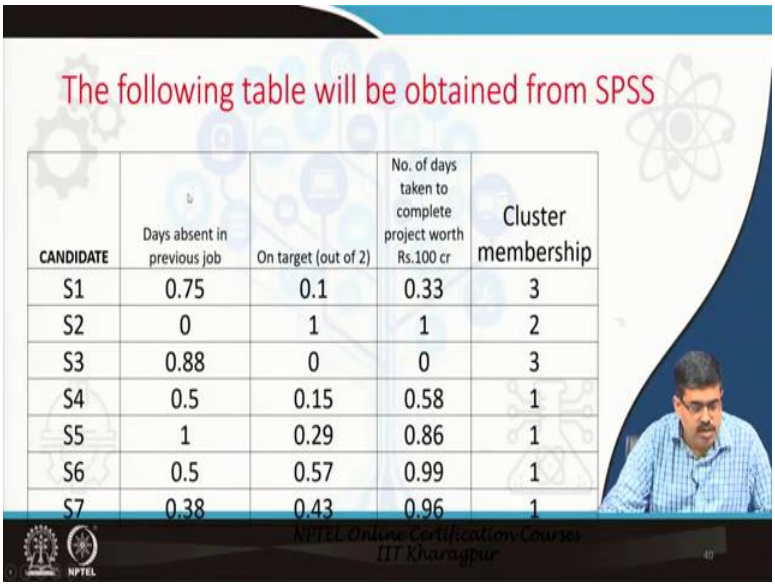


So, for doing any project, if I want that only 2 groups to come up I will mention that I want 2 clusters. If I want my entire team in my entire organizational IT team to be divided into 3 groups, I will want 3 clusters. If I want 4 groups I will say I want 4 clusters. So, K means basically helps us to define the groups also to define the clusters also ok. So, this is what is K means clustering; right?

Now, when you so, that is what we said we will use K means clustering and we specify the number of clusters to be 3. Because in our problem, we have said that we want 3 groups ok. We can use SPSS for this purpose, in SPSS what is done is I think many of you are already aware and have used SPSS as a software.

SPSS you type in the data, you put in the data go to clustering in the analyze icon, under analyze icon you will get clustering go to K means clustering. And there you specify the number of clusters, if you want 2 clusters specify 2, if you want 3 clusters specify 3. So, you specify the number of clusters that you want; ok. So, K means clustering. So, cluster membership needs to be specified that is specify the number of clusters.

(Refer Slide Time: 20:55)



Now, once you specify this table will come ok, just a second yeah some somehow this has this has shifted basically yeah. Now, it is fine yes sorry yeah ok, now it is fine I suddenly saw that it has shifted ok. So, see candidate 1, now look it very carefully candidate 1, I am reading it out candidate one days absent in previous job on target number of days taken to complete the project work.

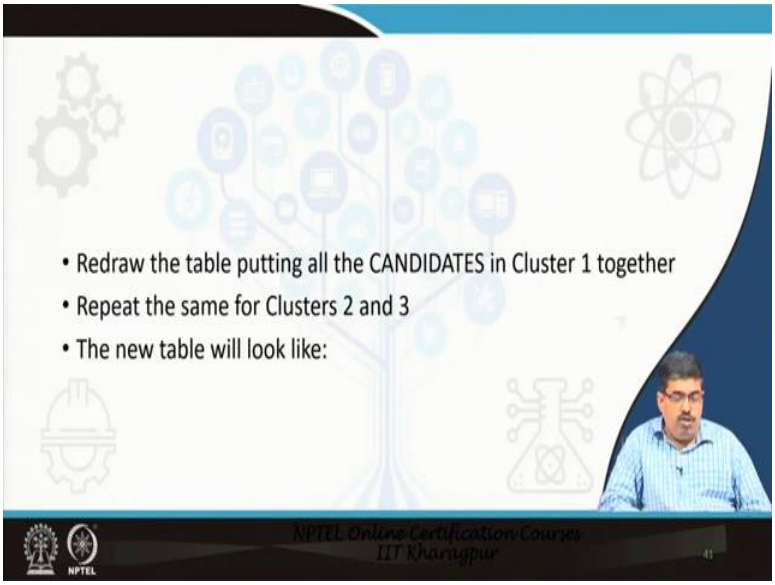
These were the data that I gave SPSS and as and I mentioned that I need 3 clusters. SPSS has come up that candidate 1 last column and last column SPSS has come up with candidate 1, cluster membership is 3; that means, he is in cluster 3 S. Candidate S 2 is in cluster 2, candidate S 3 is again in 3, candidate S 4 6 and 7 whatever S 4 5 6 7 they are in cluster 1; ok.

So, so it is clearly mentioned that cluster 1 has 4 candidates, cluster 2 has 2 candidates and cluster 3 has 2 candidates sorry. Cluster 1 let me correct myself cluster 1 has 4 candidates, cluster 2 has only 1 candidate, that is candidate 2 and cluster 3 has 2 candidates that is candidate 1 and 3; ok.

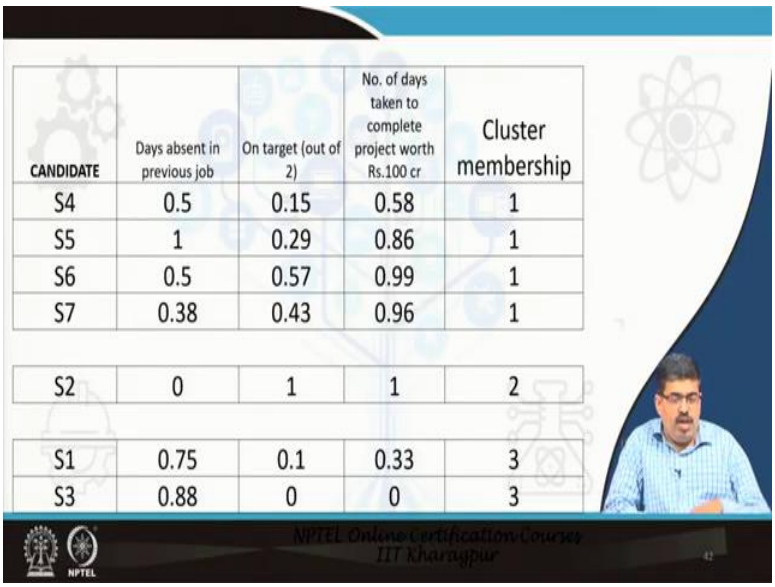
So, 3 clusters cluster 1 has 4 candidates cluster 2 has 1 candidate and cluster 3 has 2 candidates. Now, my question is that does it mean cluster 1 does it mean best cluster. Answer is no cluster 1 does not mean it is best best cluster, cluster 1 means you have asked you have asked for 3 clusters, it has given you 3 clusters finished it is based on

again the distance ok. Now, which cluster is better than the other that you will have to calculate; ok.

(Refer Slide Time: 23:06)



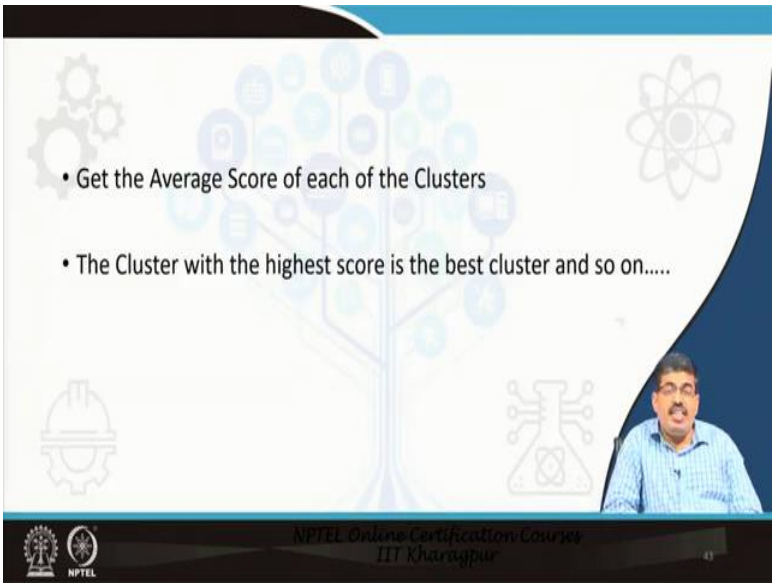
(Refer Slide Time: 23:11)



So, yeah, read all the table; ok. So, now, now what you do is you take cluster 1 people together, cluster 2 people together and cluster 3 people together; ok. So, now, you see cluster one is taken together cluster 2 is separate and cluster 3 is separate; ok.

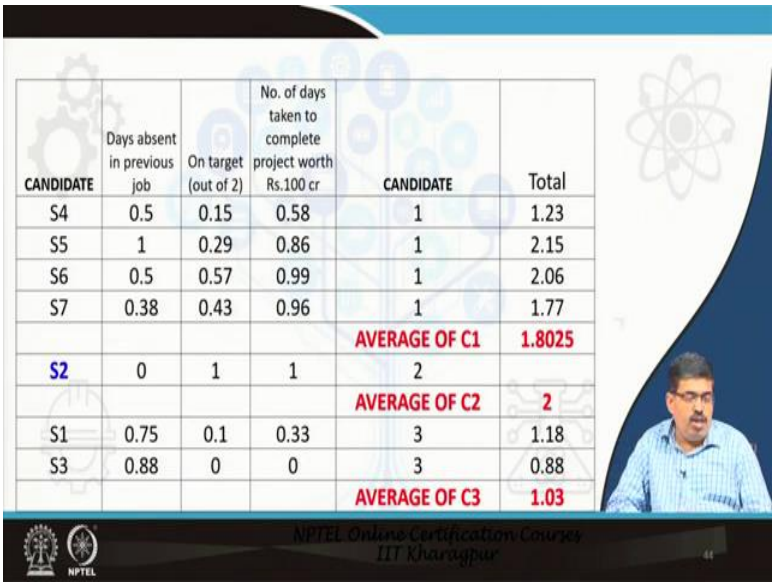
So, you see candidate S 4 5 and 6 have gone in cluster 1 candidate 2 is in cluster 2 alone. As we mentioned and candidate S 1 and S 3 is in cluster 3 ok. So, you have taken them together.

(Refer Slide Time: 23:39)



Get the average score of each of the clusters. The cluster with the highest average score is the best cluster ok, get the average score for each of the clusters the cluster with the highest score is the best cluster.

(Refer Slide Time: 23:54)

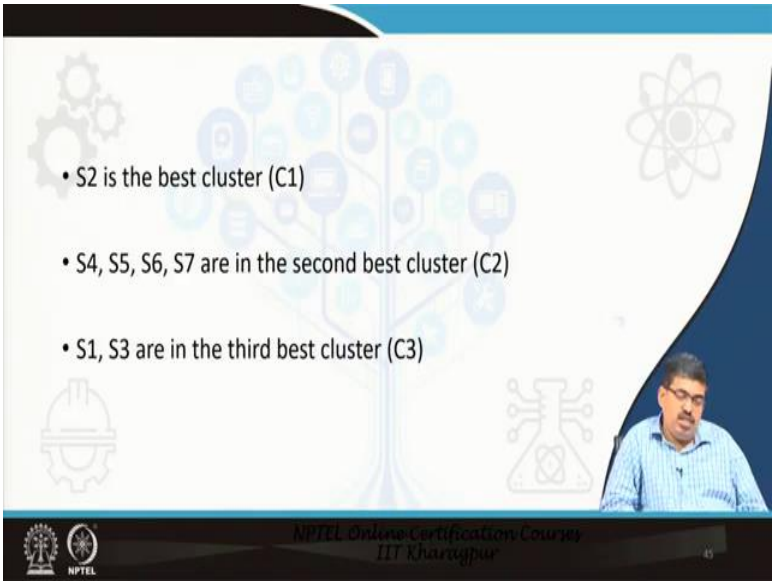


CANDIDATE	Days absent in previous job	On target (out of 2)	No. of days taken to complete project worth Rs.100 cr	CANDIDATE	Total
S4	0.5	0.15	0.58	1	1.23
S5	1	0.29	0.86	1	2.15
S6	0.5	0.57	0.99	1	2.06
S7	0.38	0.43	0.96	1	1.77
				AVERAGE OF C1	1.8025
S2	0	1	1	2	
				AVERAGE OF C2	2
S1	0.75	0.1	0.33	3	1.18
S3	0.88	0	0	3	0.88
				AVERAGE OF C3	1.03

So, what is the average score? Total it up total the row S 4 say this S 4 0.5 plus 1.15 sorry plus 0.15 0.58 total is 1.23. So, total it then average. Then sub average of s two cluster average of C 3 cluster. So, which cluster is better? Cluster 2 that is candidate S 2 the single member cluster, he or she is better; ok, followed by cluster 1, this group followed by cluster 3 the other group; ok.

Now, definitely you can see again from this suppose you have got to do something to improve the clusters. Cluster 3 that is candidate 1 and 3 combined, there is a problem; ok. So, might be some redeployment might help to increase the average score; ok. So, that is also possible some redeployment that is also possible; ok. So, this is there, so this is the way by which you do clustering technique.

(Refer Slide Time: 25:02)



So, S 2 is the best cluster this is the second best and the third best. So, moment you see also see the huge difference in score, cluster 1 has a score of 2 and cluster 3 is a score of only 1 that is 1.03 huge difference.

So, you have to have some redeployment of people ok, have to have some redeployment of people. So, as I was saying we will take methods, same method can be used for different purposes. Employee selection, employee deployment, employee promotion everything we can just modify and use the same methods ok. So, cluster 3 some redeployment has to be done; clear! So, you see this as I mentioned references so.

Thank you for today! Ok.