Operations Management
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Lecture Number – 13
Qualitative Methods of Forecasting

[FL] Friends welcome to session 13 in our course on operations management. As you are aware that we are covering the third week of our discussion, and our focus currently is on forecasting. We have seen that for managing the operations; what are the various types of information or knowledge that is required. In the first week we have covered the fundamentals of operations management, in week 2 we focused on what the company should produce, and what tools and techniques the company should take into account or the organisation should follow in order to develop successful products.

We have seen very important, very latest tools techniques that are being applied in this. In today's scenario for developing the products, if you remember just to have a brief blimps of what we have covered, we have seen the product life cycle, we have seen value engineering concepts, we have seen design for x, we have sin ergonomics, we have seen rapid prototyping.

So, all these are the tools and techniques which are relevant in the current scenario. We have not seen the normal or the fundamental or the basic steps involved in the product design process, because they may vary from segment to segment, from business to business, but we have seen that what are the important techniques, which if used you judicially can help us to develop a successful product in the market.

Once we have that idea that what we want to produce our next stage, or next step is how much to produce or how to manage the operations, when we have to produce a definite amount, a definite volume of product; that is important, and how to get the definite number that is important; that is relevant from sales forecasting or demand forecasting point of view. And if you remember today is our third session on forecasting. In forecasting we have seen that in first session, that what is the need of forecasting; what are the challenges of forecasting. Once we have the demand forecast how that information can be used for decision making, related to manpower planning related to materials planning, related to scheduling.

So, we have seen that forecasting, usually we see is in terms of numbers or volume of production, but many time forecasting fine be technological forecasting, where we have to forecast that what are going to be the technological changes, in the next 5 to 7 years, it can be forecasting of time that when a particular country will become a developed country that is also forecast. So, forecast is not only related to demand forecast, can be used in various other dimensions or various other decision making approach is our a, can be useful for various other areas also.

So, in our discussion we have already seen two sessions on forecasting. In session 1 we have seen the importance, need, requirements and the benefits that we can derive out of forecasting. In second session we have seen the forecasting system. In forecasting system we have seen that there are certain inputs those can be internal inputs, those can be external inputs. in internal inputs we have seen the information or data or the historical data available within the company, can be internal input for making a forecast, external input can be the environmental factors. Those can be the social political economic factors that influence the business cycle or the business environment.

So, you have certain inputs that you give to the forecasting methods and these method can make use of this input to produce an output, and output basically is the demand forecast and the forecast error. So, there is a input, there is a processing system or processing unit which are the forecasting methods, and then you get the output know this system works with certain constraints. Constraints can be in terms of data available the veracity of the truthfulness of the accuracy of the data, then the time required the skill required.

So, all these are the constraints that this system has to overcome. Then we have seen that certain decisions have to be taken. What are these decisions you have to decide that which method you have to use, like today's topic is qualitative methods of forecasting, then there are quantitative methods of forecasting also. As you seen in the previous session, the last slide was the classification of methods in which we have seen that there are qualitative methods and quantitative methods of forecasting.

So, today we are going to cover the qualitative methods of forecasting. So, in the forecasting system you have to take a decision that whether you are going to use qualitative method of forecasting or you are going to use quantitative method of

forecasting. Once you decide that i am going to use qualitative method of forecasting. Further you have to make a decision that which type of method you are going to use. Similarly for quantitative also, you have to take a decision among the quantitative method, which method is most suitable to the current scenario, for to the current market segment or for the current product that decision has to be done. Similarly the decision has to be taken related to the information or the data that is available to you, whether we are going to use the last 10 years data or we are going to use the last 5 years data only for making a forecast.

So, that decision also has to be taken. So, the various elements after forecasting system are the inputs the forecasting methods. The output, the constraints and the decisions that you have to take, and now our focus primarily in today's session and in the subsequent sessions on forecasting will be on the forecasting methods. Only we will try to learn the simple, most simple methods that are use for making a forecast. Although, these days people are making use of artificial intelligence tools also for making the forecast prediction. Markets are being used for making the forecast, but those methods we can say are in the research and development. Stage show will not be covering them as a text. In the course we will be covering whatever is available in the textbook, which is usually talked to the learners who are the beginners in the field of forecasting.

So, we will be learning the basic methods of making of forecast, and in that series our first focus is call the qualitative methods of forecasting, qualitative methods of forecasting are applied in very special circumstances. Now what are those circumstances? we will try to understand today, you must be able to answer this query that where you are going to use the qualitative methods of forecasting, and where you are going to use the quantitative methods of forecasting and important questions. And the answer to this question we are going to look forward to in today's discussion

So, let us start our presentation on this topic. The topic for today is qualitative methods of forecasting. This is just the repetition of the last slide that we have seen in the previous session.

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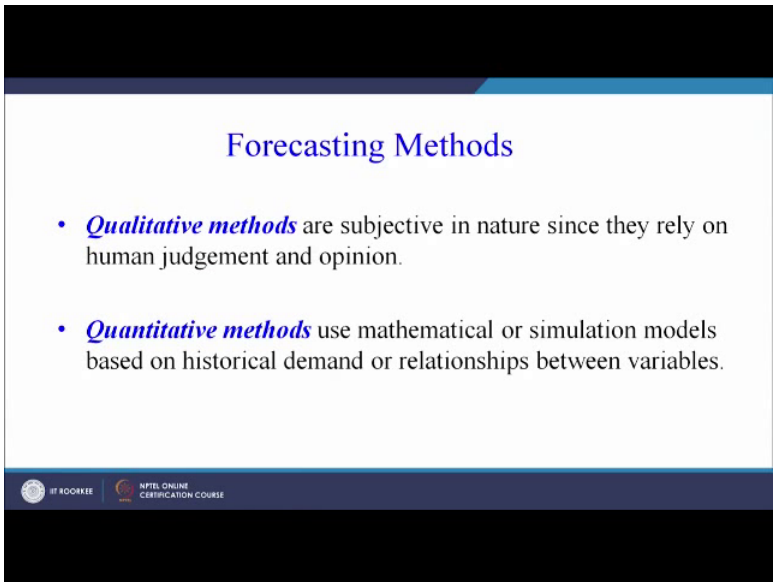

Qualitative methods are subjective in nature, since they rely on human judgement and opinion. So, many times we say that these are, may be dependent on the experience, the information available with the people working in the organisation quantitative methods, on the other hand use mathematical or simulation models based on historical demand or relationships between variables.

So, mathematics and simulation is involved, in case of quantitative methods of forecasting we may develop and equation, as i have discussed in the last session also, we may have a equation of a straight line, if we have a trend component. For example, on x axis is if we take x axis is we take time y axis, we take the demand data; that is available with us for the last 5 years and we see, that there is a continuous increase in the demand for the last 5 years.

So, 5 data points we have for 5 different years. We have 5 demand data available with us, what we can do? We see that there is a trend, very easily we can develop a straight line equation fitting this data, and then we can use this equation for making a forecast for the sixth or the 7th year. So, basically that type of equations can also be used mathematically for forecasting the future demand. So, here we can see that sometimes we make use of the previous data; that is available with, you simple average method, moving average method, weighted moving average method. All these methods depends upon the previous or depend upon the previous year's data or records.

So, in qualitative methods we will focus on human judgement experience and service, whereas, in quality sorry, whereas, in quantitative we will focus on mathematics and simulation models for making a forecast. So, there is a difference between the two approaches, but today our focus is on qualitative methods of forecasting.

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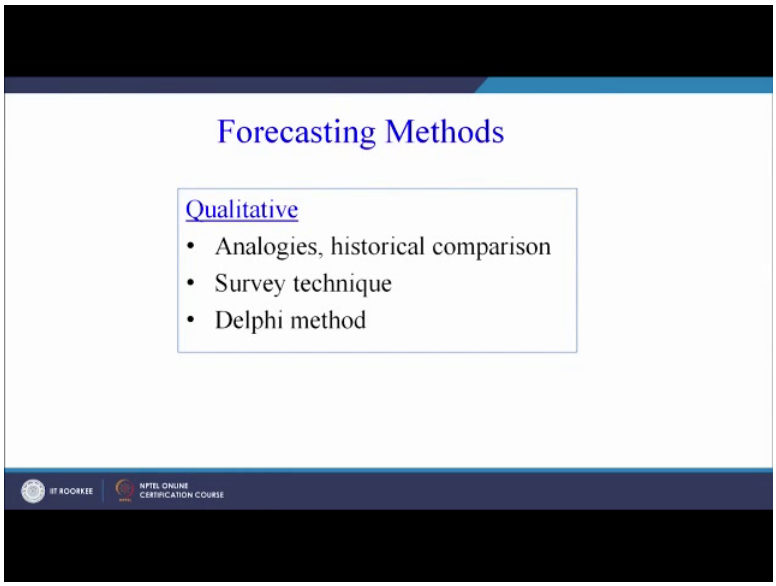

So, there can be number of qualitative methods, different companies maybe following. What we have tried to summarizes these into 2 or 3 important techniques that are used for making a forecast.

So, first one is analogies or historical comparison, the second is survey technique and the third one is the Delphi method. Usually we cover Delphi method we one session of 40 to 45 minutes can be dedicated to only to the Delphi method, but since we have to cover all these techniques in today's session of maybe half an hour. So, we will be quickly trying understand that how about you, what are the basic once season, what are the basic you can say contractual things or contextual things in relation to each and every methods

So, we will try to understand the basic context of each and every method that is mentioned here. So, let us start our discussion, but prior to that we need to understand that where our qualitative methods are going to be used quantitative method, this is again reputation.

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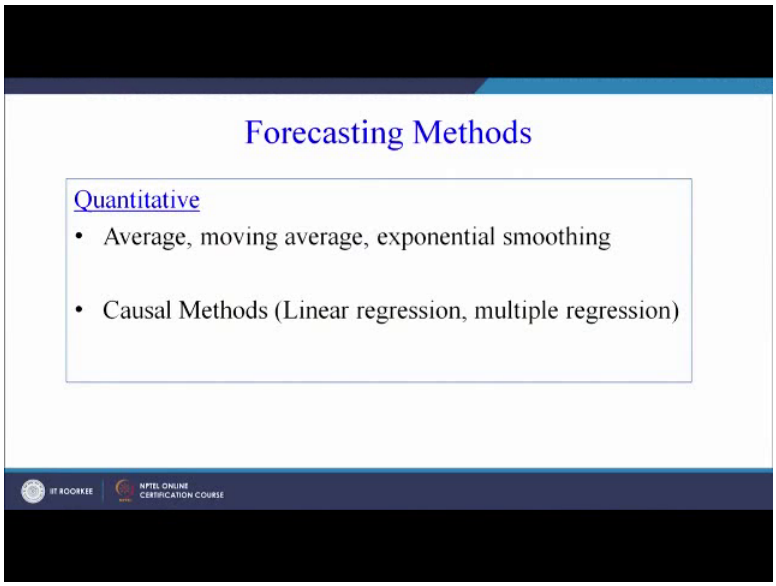

So, quantitative methods are average, moving average exponential smoothing and causal methods, like linear regression, multiple regression and we will be covering them, it covering these method in our session 4 and 5 for this week.

So, today is session 13. So, we will be covering these two in session 14 and session 15. So, today our focus primarily is on qualitative methods. So, I will not speak much on these method, because tomorrow maybe the next session, and next to next session will be focused on quantitative methods of forecasting only. So, let us start with the qualitative or subjective methods of forecasting. So, why they are used as I have told that there has to be a strong case where we can apply a qualitative method of forecasting.

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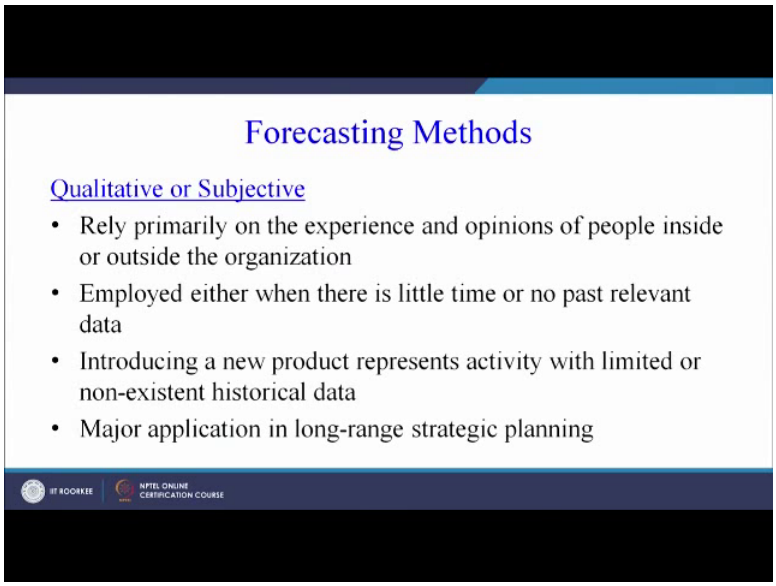

So, we have to make that strong case and what are the application areas, where we are going to use qualitative methods are listed here. So, I will read it for you on your screen, you can see qualitative methods rely primarily on the experience and opinions of people inside or outside the organisation. So, as i have already highlighted the experience of the information or data available with the people within the organisation or outside the organisation, can be used for making qualitative type of forecast, employed either when there is little time or no past relevant data.

So, this sentence is very important, the previous sentences; yes we can say it is based on experience, based on judgement, based on intuition, based on sixth sense. So, that is we can say the basic crux of making of forecast in case of qualitative methods of forecasting, but the second point is very important, you can see here this will answer your question, where you can use qualitative methods of forecasting, you can very easily answer these are employed either when there is little time.

So, it means that qualitative methods of forecasting can be used where you have little time for making a forecast, when you want to launch your product as quickly as possible, in those circumstances, in those cases instead of going for a rigorous mathematical calculation and then analysis, we can make a qualitative type of forecast based on judgement, based on comparison, based on the historical information or the experience

available with the people working for the organisation. So, when time is a constraint qualitative methods can be employed.

Similarly, when no past relevant data is available; so I am saying information. So, there is a difference between information and data. So, experienced person may be having some information, because of his experience, because of the time he has spent in the organisation. So, that information or that we can say intelligence or that kind of know how that person has developed over a period of time, is used for making a qualitative type of forecast. In case of quantitative type of forecasting we will make use of the data, the mathematical data.

The numbers that are available with us for the previous years. So, we can see that qualitative methods are most suitable in two cases. Case number 1, when you have time constraint that you are very less time for making a forecast, and the case number 2 when you do not have the numbers, when you do not have the relevant data available with you. There is no historical information or data that is available in the form of numbers are the volume of products which have been sold in the previous years. Similarly we can say that when you are introducing a new product, it represents activity with limited or nonexistent historical data

So, you can further add that if time is a limitation, no historical data is available as well as when the new product is being launched the product has no predecessor. There is no product which is related to this new product, which is based on a completely new technology. So, you would have no previous information or data available with you. In those circumstances qualitative methods become more hand, your more useful. So, major application of qualitative methods is a long range strategic planning. So, we have seen that we can make short range forecast, medium range forecast and long range forecast. So, for long span of time when we have to make a strategic forecast, we can go for qualitative methods of forecasting.

So, we can say one example can be the technology forecast, maybe what is going to be the technology 10 years here on in case of communication, or in case of mobile communication. So, we can make a forecast. So, it may not be relevant what is happening in the last 5 years in mobile communication. So, last next 10 years we can say

that instead of focusing on what is happening in the last 5 years, we have to see and forecast that what is going to happen after 10 years.

So, the previous data becomes irrelevant, but we have to use our judgement, we have to use our information we have to study the technology, we have to study the research papers, and come up with an idea that what is going to be the mobile communication in the next 10 years or maybe after 10 years. Therefore, we can see that the application of qualitative methods of forecasting is the long range strategic planning. So, we can say with confidence. Now that where qualitative methods of forecasting can be used, number 1 then we can also see that what are the applications. One of the major applications is long range strategic planning or long range strategic forecasting can be done using the qualitative methods forecasting.

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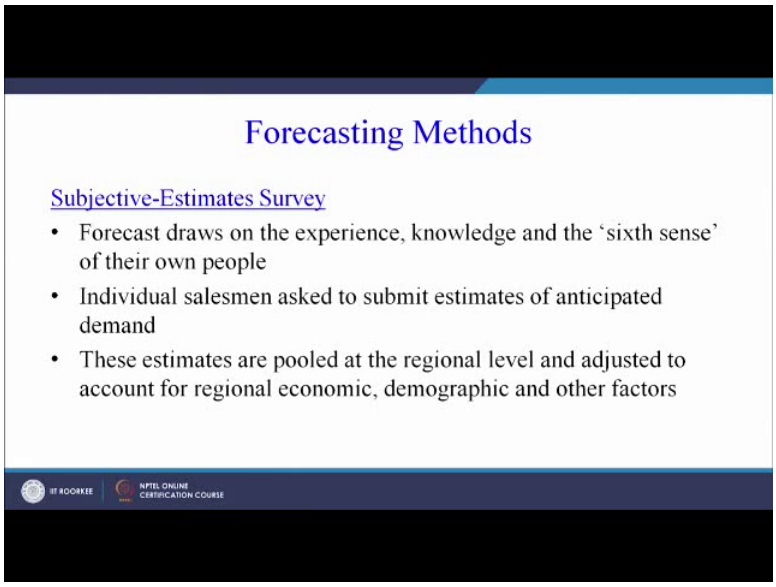

So, let us see in subjective we have seen the previous slide; that is qualitative subjective methods, where they can be employed what are the major application areas. Now we can say that; what are the estimates of survey technique for qualitative methods of forecasting. So, this is one of the methods of forecasting which falls under the qualitative methods. Now forecast draws on the experience knowledge and the sixth sense of their own people. So, when an organisation is going to make a forecast they will tell their people, seek their opinion that how much do they feel the company must make in order

to satisfy the demand in the market. So, the sixth sense, the knowledge, the experience of the people working for the organisation is used in the survey technique.

Now, individual salesman are usually asked to submit estimates of estimated or anticipated demand. So, individual salesman will give their forecast based on their experience that knowledge of the market or their interaction with the retailers. So, the salesman are the source of information for making a forecast, know whatever forecast has been made by the salesman, these estimates are pulled at the regional level and adjust to account for economic demographic and other factors.

So, whatever numbers are coming from the salesman we are not blindly going to follow these numbers they require some kind of moderation based on number of factors maybe demographic factors there can be economic factors also there can be political or social factors also. So, we have to adjust the numbers in order to make an accurate forecast in survey technique, the salesman act as the maybe basic source of information which is pulled to make a forecast.

Now, the revised regional estimates. Now maybe we can take an example of the state of Uttarakhand. Now we are in Roorkee. So, we the salesman may get an estimate for the town of Roorkee which can be pulled at Roorkee level. Then finally, in district Haridwar there maybe 2 or 3 such town. So, that estimates of each town can be pulled at the district headquarter and then can be adjusted based on, maybe the various, maybe seasonal variations, may also be there. Sometimes the estimates may be based on the nature of spending the people in the town or in the city. So, number of parameters are used to fine tune our data or information.

So, the revised regional estimates are combined at the headquarters with further adjustments related to the economy international trade competitors and other development.

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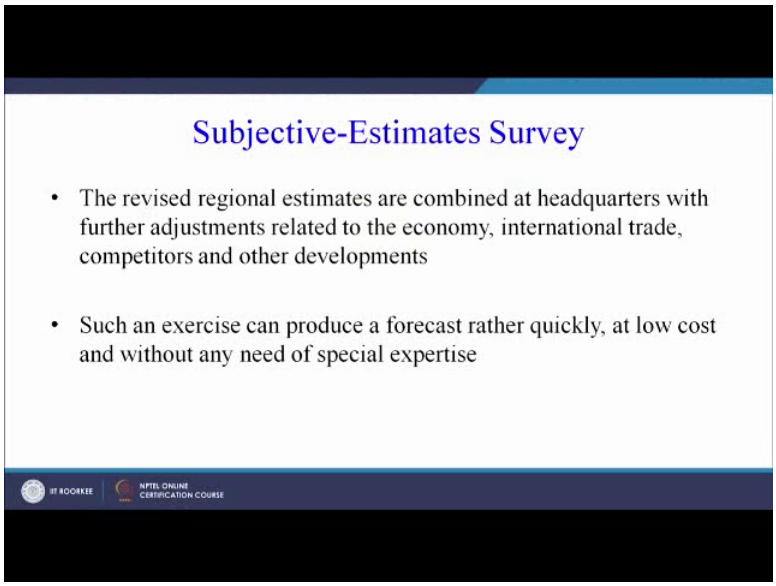

So, number of parameters are taken into account while deciding that what is going to be the demand for the next, maybe a month or a quarter or a year. So, survey technique with salesman's act as we. So, we can see the source of information, the data is collected in a pyramid manner. So, maybe larger base, then consolidated, further consolidated at head quarters and finally, maybe at the country level, the complete forecast for the next 6 months of year of a quarter can be done. Such an exercise can produce a forecast rather quickly at low cost and without any need of special expertise.

So, we can say that step by step salesman pulling the data at regional level than at the central level, the data is pulled, it is adjusted based on the international trade situation economic depression or boom political situation or demographic situation or demographic, we can say details. So, based on different parameters the tweaking of data is done, minor tweaking of data is done in order to reach the forecast, and you can see the advantages of making such a forecast that it can produce it quickly. So, the time is saved without cost. So, your funds are saved.

So, as you spend less money and you need not require any special expertise. So, which means that no special skills are required or knowledge of mathematical tools that can be used for making a forecast. So, it is easier to make if you remember the forecasting system. We have covered in the previous session, there were certain constraints and three of the constraints have been addressed here. Time was one constraint, data was another

constraint and if you see expertise was a third constraint, and the cost was the fourth constraint. So, cost also is less, time required is less, skill required is also less and data is not available. Therefore, we are making use of the qualitative methods of forecasting, it was real generating the data from the salesman, then it is pulled at the regional level, then it is pulled at the headquarter level.

So, we are generating the data, we are not using any previous or 5 or 7 years back data for making a forecast. And therefore, we can say that there are certain advantages with the qualitative methods of forecasting, which most of the companies try to take advantage of. Now what can be the drawbacks? there is no method which is always or can be applied in each and every situation.

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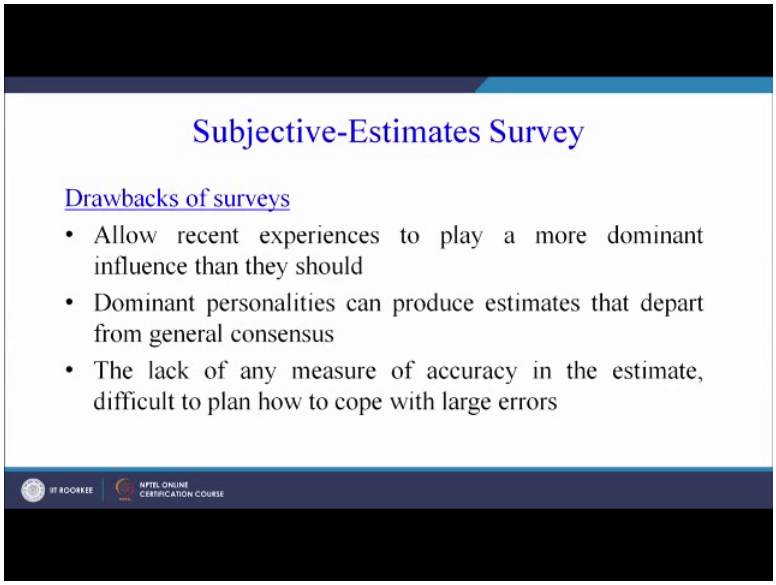

Now, what can be the drawbacks. So, let us quickly go through the drawback of these survey technique, allow recent experiences to play a more dominant influence, then they must now, maybe in the last 2 months there have, there may be a situation that they are the sales are very high as compared to the previous 10 months.

But we say that the last month, the sales have been high, we will do not try to average out based on last 2 months. Only we may forecast for the next month which may not be correct. Recent experiences is play a very dominant role in our decision making, second is dominant personalities can produce estimates that depart from the general consensus. So, that may has also happens. So, when your pulling the data at the, sorry regional level

when you are combining the or maybe adding up the data at the headquarter level. There maybe certain dominant personalities who may influence the forecast in qualitative methods of forecasting, which is not possible in quantitative method, because you are your based, or your forecast is based on mathematical data and on calculation. So, dumb the role of personality do not come into picture the lack of any measure of accuracy in the estimate. So, that is another challenge difficult to plan, how to cope with large errors.

So, lack of any measure of accuracy in the estimates. So, maybe with the performance criteria for these methods may not be that well defined and we can calculate, maybe at a later stage, that what is the forecast error which maybe is available with us, if we have the historical data that we make use of for making a quantitative forecast or values in quantitative methods of forecasting. Since we have the forecast error available with us for the last 5 to 7 years, we can judiciously fine tune our data accordingly. So, that we are close to the accurate value, but in case of qualitative method, the measure of in accuracy or the lack of measure of in accuracy, sometimes maybe a deterrent. In the last method that I wish to cover today is the Delphi method, very commonly used methods in organisations.

So, we have seen the survey technique, the advantages and limitations of the survey techniques. And finally, we are covering the Delphi method. So, in Delphi method we follow this flowchart. The first is the issue selection.

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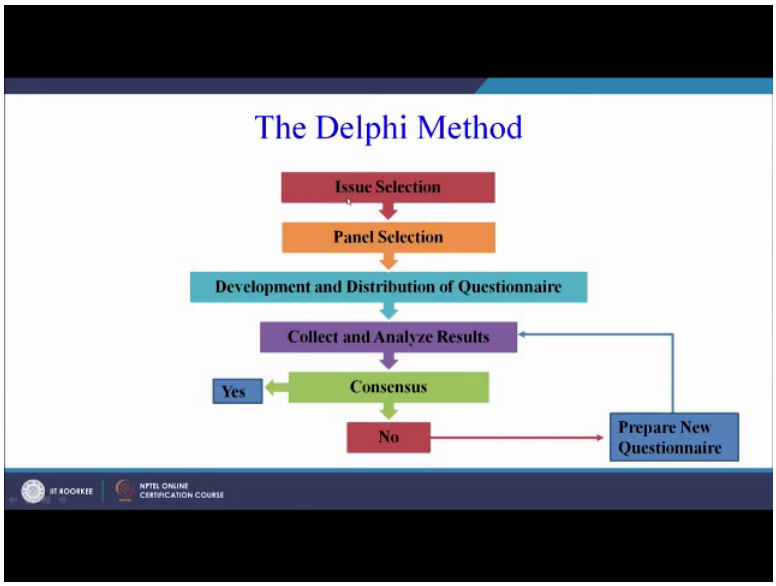

We need to see that what we need to forecast, what is the requirement and what is finally, the outcome; that is desired from the whole activity. So, first we have to select the issue or the objective with which we are making a forecast, then there is a panel selection. Now this Delphi method is based on a panel of experts know. Some of the experts can be internal experts, some of the experts can be external expert. So, you a make panel of experts who have the information related to that product segment.

So, maybe if we are forecasting the number of sim cards to be sold or maybe sold by a company, which is launching its separations. We may have on board experts from the other service providers, who are working in that market for the last 5 to 7 years. So, first important activity is the selection of the panel, then we develop a questionnaire. A coordinator appointed for the whole activity and he develops a questionnaire and distributes the questionnaire to the panel. Now one thing which is usually practiced in Delphi method is that, the identity of the panel members is kept confidential. So, each panel member will not be aware that; who are the other panel members, who are working for making this forecast.

So, while selecting the panel we have to ensure that the panel do not or the panel members are, we can say unaware of the people who are the other people on the panel. So, panel selection is important then the coordinator will develop a questionnaire, the questionnaire will be sent to each and every panel member. So, whatever answers or whatever recommendations are given by the panel member, they are collected and the analysis of the result is done, and if the consensus is reached we can say we have the number or the forecast for the issue, that we have selected for the area, for which we are making a forecast of the product, for which we are making a forecast. If it is not the, there is no consensus there is wide variation in the, you can say response is of the panel members, then we may prepare a new questionnaire by modifying some of the questionnaires or sometimes a report is prepared which has all the information ,which has been provided by the panel members in their first answers or in their answer to the first questionnaire

So, second questionnaire is produced where we incorporate all these information and prepare a report, which is sent along with the second questionnaires. Now sometimes it may happen that a particular panel member may not be having a specific piece of information, which now he can read in the report, and may like to fine tune tweak or may

be change his value of the forecast, or his forecast that he has done in the first questionnaire. So, maybe this iteration can be done two to three times depending upon the consensus value that is arrived, maybe iteration can be done, two times iteration can be done, three times the questionnaire maybe to it. The report may be changed based on the continuous flow of information, when the panel experts are giving their answers to the maybe subsequent questionnaires

So, basically to simplify the whole thing, a panel is formed or constituted, they are given a questionnaire, they respond to that questionnaire. The results are analysed and if there is a consensus, the answers are forwarded to the organisation, but if there is not a consensus, there is variation another set of questionnaire may be given with or a brief report of the first cycle of you can say questions and answers, or first questionnaire maybe as a report based on the first questionnaire will be sent again to the panel member. So, this iteration can continue two to three times, and finally, we will get our forecast; that is again a qualitative method of forecasting, because we are not using any 10 or 15 years previous years data, we are directly relying on the experience and judgement or we can say intelligence of the panel members who are helping us or helping the organisation to make a forecast.

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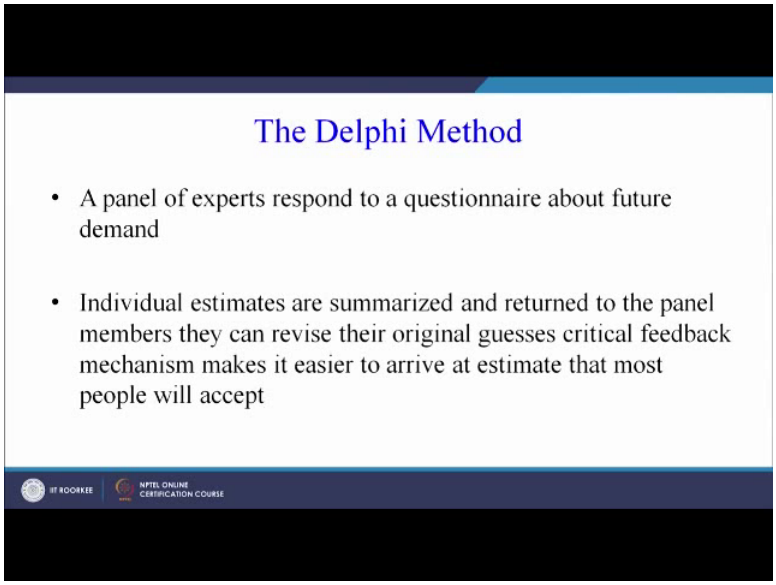

Now, a Delphi method, just brief summary a panel of experts respond to a questionnaire about the future demand, individual estimates are summarised and returned to the panel

member. So, that they can revise their original guesses, critical feedback mechanisms make it easier to arrive at estimate that most people will accept. So, critical feedback is in kind of a report that is distributed among the panel members.

So, with this we conclude today's session, we have seen the qualitative methods of forecasting, we have seen where the qualitative methods of forecasting can be applied. We have also seen the Delphi method of forecasting, and how it can help us to make a forecast without any previous data available with us. So, we can say that qualitative methods of forecasting, also have got their specific application areas, and all learners must have information related to the qualitative methods of forecasting.

In our next session our focus will be on the quantitative methods of forecasting, where we will do simple calculations to make a forecast based on the previous year's data.

Thank you very much.