Integrated Marketing Management
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Lecture - 18
Decision Models

So, welcome back we now look at a few Decision Models.

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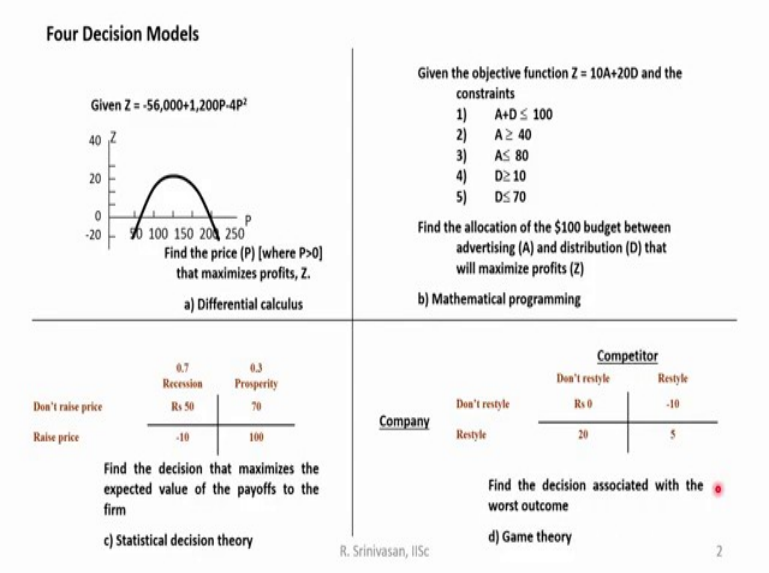

So, as I said earlier this decision models make use of mathematical routines. It can be differential calculus, it can be the mathematical programming, or it can be the statistical decision theory, or the Bayesian analysis or you can make use of the game theory.

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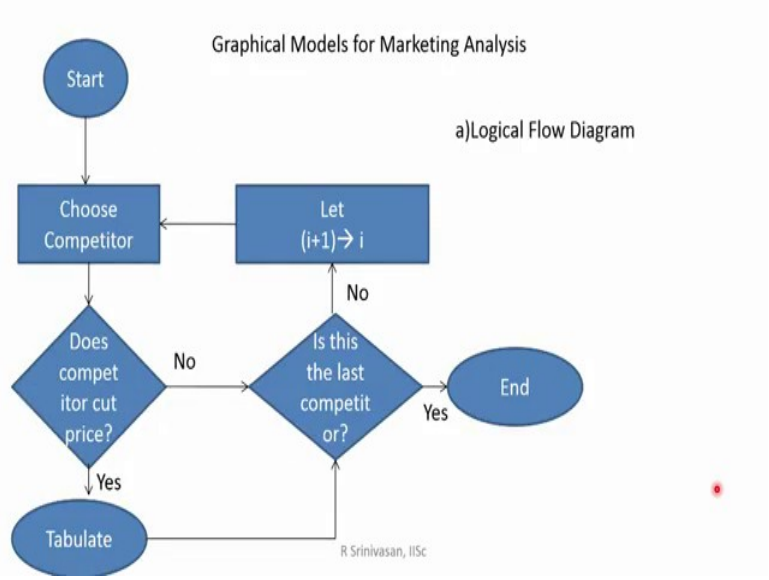

So, what I am going to explain to you in this class is this four; one is the decision models making use of differential calculus, then mathematical programming, then statistical decision theory, then the game theory. I will explain this taking simple examples, you take an equation Z equal to this 56,000 minus 56,000 plus 1,200 P minus 4 P squared.

Now, suppose you are given this type of an equation and you are asked to find the price, where price P that maximizes profits P always greater than 0. So, how are you going to do that? You are going to look at DP by DZ D squared P by DZ. When you are looking at DP by DZ and D squared by P by DZ, you may end up with a situation, when you solve this equation, that at the price of 150 your profits will be maximum.

So, when the price of the product is priced at 150 you are likely to get the maximum profits, that is Z. So, this makes use of differential calculus to get this. So, take the first differential, the second differential, make it equal to 0 you will get this value. The second one is where we make use of mathematical programming. I have taken a mathematical programming makes use of an objective function. What is this objective function? You for the same profits you say you identify 2 variables which are likely to affect the profits say for Z that is a profit.

Suppose, you construct this equation Z is equal to 10 A plus 20 D, where A stands for advertising D stands for distribution, that is the amount of money how because the numbers are very small I am taking it in dollars ok. So, suppose you are A plus D is less

than or equal to a 100 these are the constraints. So, this is the objective function Z is equal to 10 A plus 20 D, subject to the constraints that A plus D should always be less than or equal to 100, A should always be greater than or equal to 40 that is the amount of dollars you are going to put on advertising should be always more than 40.

But, it cannot go beyond 80, that is less than or equal to 80. Similarly, your D should always be greater than or equal to 10 less than or equal to 70 for a typical situation. Now, when you solve this taking this to these types of scenarios you can solve it very simply. So, 10 A plus 20 D how much you should get? You may find that by putting different values you may easily come to the D less than or equal to 70 is the next this thing.

You may say how much money should I put on D and how much money should I put on A to maximize the profit? Suppose, I put let us say 40 on this and then you I put another 60 on this, what is going to happen? If you see that your 10 A plus 20 D how much you are going to get, but the budget is only a 100 dollars kindly note that.

So, how much should I do this? To get the maximum value of D you may end up saying that I put 40 for A and I put 60 for D and I may get the maximum value of Z. This is illustrating it by very simple example, then we may make use of this statistical decision theory. Let us say there are two scenarios which you are visualizing; one is the economy goes into recession, the second is the economy goes into prosperity.

Now, as a company you are having two choices; one is to raise the price of the product, another is not to raise the price of the product. Kindly note that all these are hypothetical scenarios, just to illustrate what is this decision models. Suppose, your probability of recession is 0.7, then you raise the price of the product, if you raise the price of the product you are going to incur minus 10, that is you are going to incur a loss of rupees 10.

But, suppose you do not raise the price of the product, what is going to happen? You may, you are likely to incur a profit of rupees 50. Similarly, when the economy is prosperous, what is the probability of the economy being prosperous it is 0.3, how did you get 0.33 both the recession and the prosperity probability put together must start to 1. Now, suppose you do not raise the price of the product when it is a prosperous economy, you are likely to end up making profits of 70.

And, suppose you raise the price when the economy prosperous, you are likely to end up making a profit of 100. Now, you may be asked to find out find that decision that maximizes the expected value of the payoffs for the firm. So, how are you going to do that? Suppose in a prosperous situation, if you do not raise the price of the product multiply this probability of prosperity by not raising the product, you are going to get 21 for this, then for a recession if you see you are going to get 35 for this.

So, what is this? Suppose, irrespective of whether it is a recession or prosperity you do not raise the price of the product, the value of the payoffs is likely to be 21 and 35. Now, suppose you raise the price of the product what is going to happen? You are going to end up 7 here raising during recession, during prosperity you are going to end up with 30.

So, you may say whether it is a recession or prosperity, it is better for the firm not to raise the price of the product, because still it may be having a good profit margin to come in. So, this is how you actually make use of this. This is explaining to you in a very simple manner, how does the statistical decision theory work?

This is given this is given by this gentleman base; it is goes by his terminology called the Bayesian analysis. The other one which you make use of in the decision models is what is called a game theory; this is called game theoretical modeling. This is very popular, you whether it is a stock market situation, whether it is a competitive market situation, you again make use of different types of scenarios. What is presented here is one company one competitor. The scenarios presented is whether to restyle the product or not to re style the product.

So, this is what happens in most of the automobiles, you keep on changing the styling of the product. So, one product, one car, which came with one style at one particular point of time might not be there after 1 or 2 years. So, if you consider the present scenario, most of the prospective consumers are taken in by the styling of the Honda city car just say what a method of styling, which is adopted.

So once a particular styling for a product comes in it lends itself to imitation by other players, who are competitors in the marketplace. So, they will change it rehash it very slightly, come out with the different styling characteristics, which will again appeal to the customer, the hope in the hope of appealing to the customer. Suppose, you are the company and you do not restyle your product the competitor also does not re stylist

product. What does that scenario tell you? Both of you are where you where he is also not re styling, you are also not restyling that is you make 0.

So, known there is no change that is taking place. Suppose you restyle, but the competitor does not restyle, you restyle the product that is your product, but the competitor does not restyle the product, then you make 20 rupees profit let us say. Suppose, you restyle and the competitor also restyles, then both of you may end up making 5 rupees profit. Suppose you do not re style and the competitor re styles, he may end up making 10 rupees loss.

Suppose this is the type of scenario, which gets presented ok. As a company when are you very well off that is you re style the competitor does not re style, but normally does not happen kindly note that, the competitor will not allow you to run away with 20 rupees profit.

So, you restyle and competitor also re styles both of you may end up making up with 5 rupees profit. This is probably the best scenario both of you where both of you are at an advantage. So, this is characterized by this expression I am you are ok. So, this is go back to the Indian mythology.

So, normally we say that lord Vishnu he is sleeping on this Adhishesha. So, Adhishesha having. So, many hood heads on this. So, in front of lord Vishnu he is this big beast Garuda ok. Who is paying his respect? So, to the Lord Lord is in Yoga Mudra, this lord being in Yoga Mudra, Garuda place pays his respects to lord Vishnu at that time. So, it is said this Adhishesha Taunts Garuda, how are you Garuda are you are you ok.

For which Garuda replies, what is the replay? Both of us are when we are at this place. So, that is when the lord is sleeping and you are also ok. When, I am paying respect to the lord sleeping on you I am also. So, you come when you come out on your own and I also come out of on my own both of us are not ok, that type of scenario more or less counted almost to explain this I am ok, you are concept.

So, this is game theory. So, this is what we these are the different types of models that we use for this, then we look at some graphical models for analysis. One of the graphical models for analysis is what is called the logical flow diagram. What is this logical flow

diagram? Again look at a note that all these models are looking at the price of the product the competitor what is he doing.

So, you are starting with this scenario of the flow you choose the competitor. Now is the competitor going to cut the price of the product, suppose you come to a scenario where you say he is not going to cut the price of the product. So, you move to this is called branching. Now, suppose you are say the competitor cuts the price of the product the flow leads you have to tabulate, oh by how much is it cutting the price of the product?

Then you are going to move to this is called looping, where you say easy the last competitor. Suppose, you say yes then this flow ends here, suppose you say no it again comes back to choose the next competitor ok. So, this is where you make use off in a logical flow diagram two aspects one is the branching and second is the looping to find out what should be your action, when the competitor is cutting the price should you also cut the price or not cut the price. So, you make use of this flow.

So, in other words marketing is becoming more and more complex, it is not very simple as it used to be why it is becoming more and more complex, because the competition in the marketplace has become intense. We are making use of so, many mathematical routines yes making use of so, many computational routines to solve the different types of scenarios and marketer maybe faced in.

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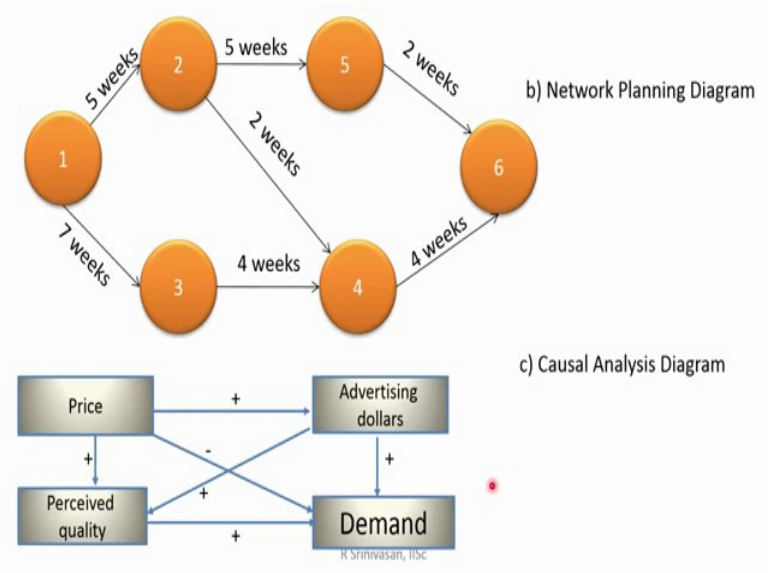

The second one which we make use of is what is called the network planning diagram. The network planning diagram makes use of the critical path look at this particular diagram; you have 6 activities coming in now. When you look at this activity 4 what can you make out. This 4 can start only when 2 and 3 are completed, then what you will make out when you look at activity 6, this activity 6 gets completed only when 4 and 5 are completed.

So, what are you likely to get through this whole network planning diagram? This network planning diagram gives you a scenario, where you find out the critical path how many weeks to be taken for this? So, if you look at this particular diagram, you may end up saying that this critical path should be 7 plus 4 plus 4, which is 11 15 weeks for this in this particular network planning scenario.

The other one is called the causal analysis diagram. So, you are looking at pricing of the product the perceived quality of the product. Suppose, the normally what is this? When the price of the product increases the consumer assumes that the perceived quality, that is the quality of the product should also be high. The company might make use of advertising that is spend more dollars on advertising or more rupees on advertising also.

When you put more and more money on this advertising you may end up with a scenario, that more of advertising can have a positive effect on the price, we can return can have a positive effect on the perceived quality, then when you increase your advertising expenditure, it is likely to have a positive effect on the demand for the product. And, when the perceived quality is assume to be very high, you are likely to end up with a scenario where the demand for the product is also increasing, this is called the causal analysis diagram.

What is the cause for a particular scenario to be coming in. Your demand increasing, it may be due to the perceived quality in the marketplace or it may be due to the advertising spending that you are doing, you may have all these types of scenarios coming in the marketplace. Then let us look at so, this is this advertising expenditures likely to have a positive effect, but the only negative effect is the in price and the demand higher the price of the product possibly you can expect the demand to string, but you are offsetting it with you are advertising and the perceived quality to a large extent.

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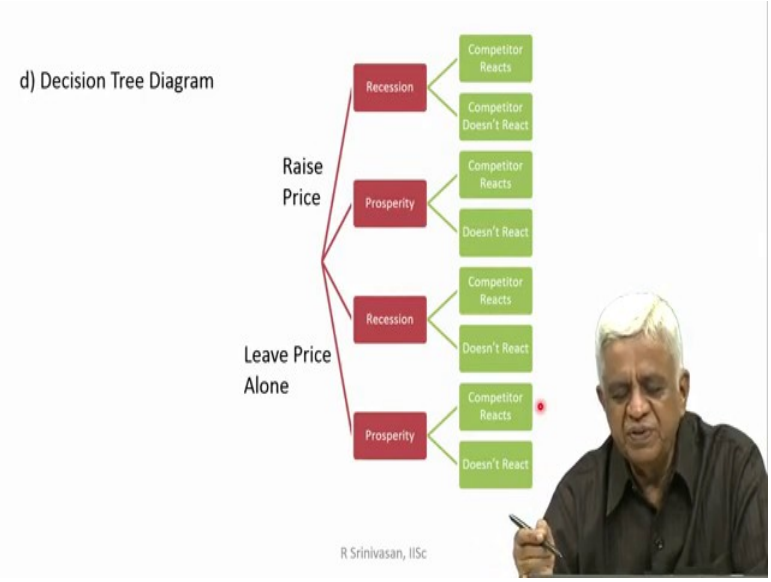

Then, we make use of what is called the decision tree analysis. So, the decision tree analysis is making use of so, many scenarios which I presented in the mathematical models as the Bayesian analysis, this is presented in an decision tree diagram. Raising the price of the product or leaving the price alone, recession prosperity, recession competitor reacts competitor does not react, prosperity competitor reacts does not react, recession competitor reacts does not react, then prosperity competitor reacts does not react.

Depending on what is going to do you will take a decision, whether to raise the price of the product or leave the price alone. All this again dependent on their types of payoffs, which I brought to your knowledge, when we used this different decisions that is prosperity raise the price do you make profits or do you make loss, the competitor does not increase the price of the profit.

Depending on the value of the payoffs that you are going to get your decision your decision is going to be affected by the payoffs that are going to come out of the different scenarios.

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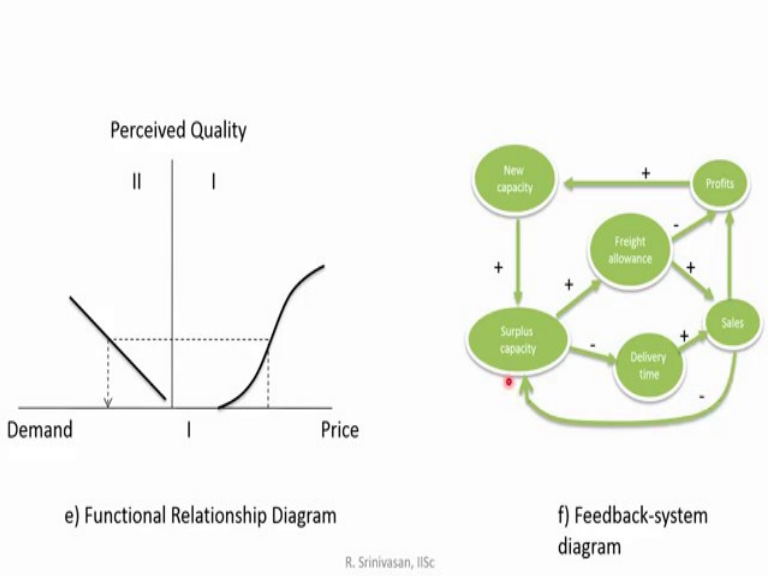

Now, the other type of model that you make use of is what is called the functional relationship diagram. If, you look at this scenario of the functional relationship diagram look at this perceived quality and the demand. Now, if the perceived quality is considered a law, what is likely to happen this demand is likely to curve this it is going to have a drop or dip in demand.

Suppose you are price of the product increases, then what is likely to happen you are perceived demand perceived quality of the product is also looked at as high? Now you have to match this quality price and the demand, if you see this these are the levels at which you can put your price, you can put your demand, so with respect to this quality.

So, with demand will be here the price will be here and these two levels the perceived quality is at this level. So, you many times if the consumer is happy are this perceived quality level, you are also likely to be happy, because you are likely to realize this particular level of demand and you live realize this particular demand at this particular price.

So, you say I stay put at this particular price, that is maintain demand. So, you are at this maintenance marketing stage here. Now, the other model which you make use of in a this is called the feedback system, what is the feedback system? The feedback system diagram if you really see, I have taken a very simple example what is this? Suppose, you

create more capacity for a form, then let us say this becomes surplus capacity likely to have a positive effect.

So, you can many have surplus effect capacity you can satisfy the demand suppose it is you are not able to satisfy with your present capacity, then you create a new capacity, this new capacity, gives you a surplus capacity, the result is you can fulfill the demand faster. What is going to happen? You are likely to have a positive effect on freight allowance and possibly this profits may increase due to this new capacity getting created.

But, what is likely to happen on the with respect to the freights? The freight allowances are going to increase it may cut into your profits a little, but the surplus capacity which you are going to create is likely to increase the demand for freight also that is freight allowance is might become more. Then what is going to happen on the delivery time. The delivery time is going to if you have a surplus capacity your delivery time will have a negative effect; that means, it is going to decrease.

And your sales is going to increase what is going to be the other side? The sales and the surplus capacity many times have a relationship which can be sometimes more or less in the negative loop only that is sales increase. Suppose, you are sales increases and your profits also increase new capacity, new due to this new capacity. Sometimes the surplus capacity you are sales does not increase can have a negative effect of the feedback.

So, you created too much of capacity let us say, then the sales may not come to the level that. So, there is a certain amount of negative feedback, which make come due to the sales. So, these feedback system dag in other words what are we trying to do. We are trying to make use of different methods by which you look at demand for a product it might happen this way, it might happen that way, whichever is the way which is going to happen you are looking at how the company can benefit due to this whole scenario.

So, this is where we stop here we continue in the next class.