ISB- Product Management

Week 8: Product Solution Design

Video 1: Module Overview

Welcome, friends, to the module on 'Conjoint Analysis'. In one of the other modules, we talked about the consumer preferences, and in this module, we will talk about the conjoint analysis.

The consumer preferences modules, we looked at lot of explicit response functionsand how to understand the consumer preferences, in terms of what is important for them and what is not. But the conjoint analysis actually goes beyond that. It first falls under the implicit response function, and we'll talk about that. But largely the conjointhelps managers understand what is important, which attributes are important and which are not.

But also, actually able to quantify those attributes better. right? Because at the end, you need to, managers, need to quantify the benefits which are offered in the product. right? How much consumers really care about, if I put the moon-roof or sunroof in the car, right? How much they will willing to pay more? These are the important questions, which can be answered through the conjoint analysis.

Conjoint analysis basically helps you understand, if you launch this particular product with these attributes and that this pricing. What would be the market share may look like? And that's a very important thing. right? We want to, before launching a product, want to have a good sense of how much market share this particular product will gain. So, those kinds of things can be answered through the conjoint analysis.

Video 2: Conjoint Motivation

So, as I mentioned, conjoint can be used for multiple purposes. And some of them are, you can estimate the market share, you can estimate the willingness to pay for different product attributes and so on and so forth. To get the sense of what conjoint does is, they think about a firm wants to launch a smartphone. right? And there we already kind of identified that the smartphone we want to launch is somewhere aroundin the 30,000 range. Okay, so, this is the target segment we are interested in.

And as you can see, there are already a lot of smartphones which catered to this particular segment, right? 33,000 smartphones. And if you look at these smartphones, they have different features, right? Different smartphones offer different kind of feature in terms of the camera battery life, this, and that, right. Now, in this mature market, you want to enter and you want to offer your own smartphone.

So, for that, of course, you want to know what are the things consumers care about. And you can do all the explicit response function to understand that this attribute is more important, or that attribute is more important and so on and so forth. But that is good. That will give you the sense of what are the things you should be focusing on.

But as a product manager, you are really interested in designing and kind of, working on the attributes after understanding that, if suppose I actually increase the battery life of a smartphone, how much extra money I will be able to charge at the market, right? How much extra value consumers will derive from that product, right? And that is important.

Now, when we do the expertise response function, although we know which attributes are important, which are not. But we don't know exactly what is the monetary value of that particular attribute, right? And that's what the conjoint analysis can do for you. As said, you can ask different respondents how important are different attributes, but that's not going to take you very far. You can ask respondents, okay, in the camera, do you prefer a two GB RAM or a 3 GB RAM? or you can ask, you know, do you care about 24 hours battery life? or do you like to have a 36-hour battery life? but what would be the answers?

Obviously, all the consumers will say yes, I want a better RAM, bigger screen size, maybe, a better battery life and the lowest price, right? So, how it's going to help you design the product, right? And that's where the conjoint helps. What conjoint does is basically, gives you the way to cost effectively develop these product offerings, which consumers value but to you, it's not very costly, right and there, this is the systematic way of getting to that particular analysis.

Now, as I said, because it's a very important kind of analysis. And I think in my opinion, conjoint is one of the most powerful marketing tools in the arsenal of the product managers, and it's very widely used, right. These conjoint analysis are used for consumer non-durables, these are used for industrial goods, are used for employee benefit packages. It is used for transportation and services, financial services, banking. Name it right? Pretty much, in all the industries I have seen, the conjoint analysis has been used and has been very useful.

Largely, if you think about what it does is basically it takes the product and what really the product is, product basically can be thought of is the composite or the addition of lot of attributes? For example, or in other words, every product can be thought of is a bundle of attributes, right so think about the credit card. What is a credit card? Credit card can be thought of in the consumer's mind bring these benefits. What is the APR? If I default on the credit card, how much the bank is going to charge me the interest rate. right? Which bank is offering this credit card? right. What is the credit limit which is offered on this? And these are attributes basically will lead to, you know, will you prefer this credit card or that credit card, right.

Similarly, the mutual funds can be broken into small benefits or the attributes if you want to talk about. Now, when I say benefits and the attributes, I'm kind of inter-changing these things from the consumer's perspective. They care about the benefits, right. But these benefits are often grounded in the attributes you provide in the products and services, right? So, in lot of cases, the attributes and the benefits basically can be interchanged.

But in some cases, the benefits and the attributes cannot be interchanged, right? So, always remember, the conjoint analysis is all about understanding the consumer

preferences and things like that, right? So, you want to use the lingo or you want to kind of, talk in terms of the benefits, not in the attributes. But like in the smartphone, everyone understands what is the better camera means, right? So, you don't have to, really, I mean, so this is the same thing. The better camera for the manufacturer has the same meaning as it further for the consumer. And I'll talk about that in a second when we go through the example. In some cases, it's not true that how the product manager looks at the attributes of the product versus how the consumer looks at the benefits, and sometimes the benefits may not be directly related to the attributes of the product, right?

So, as I said, any product can be thought of as the combination of the bundle of attributes. right? The commercial aircraft. What is the capacity? How far it can go? What is the fuel efficiency? What is the price of the cost-of-service contract? right. The smartphones, we have already talked about the RAM, processes, screen size camera and things like that.

So, how do we basically go about conjoint. In the conjoint, generally think about, it's a combination of a survey and the statistical technique. Okay, so, what we do is we create hypothetical products, right. Products which may or may not, we may or may not launch in the market, may or may not exist in the market, and we'll talk about how to create these hypothetical products.

We create these hypothetical products and show it to the consumers and the consumers kind of rate these hypothetical products, sometimes choose between the multiple hypothetical products and looking at what their choices are, what their ratings are, we can kind of infer what is important for them, right? And using that information, we can create a simulator which can help us understand if we launch something which we are interested in, what would be the market share look like.

Video 3: Overview of the Conjoint Analysis

So, before jumping into the detailed analysis, let me give you the big picture overview of the entire conjoint analysis, right. Conjoint can be divided into primarily four major steps, right. So, think about step one is about identifying what are the attributes and the levels of those attributes we're going to use in this study. Then we're going to create this survey, and then the next step would be we're going to take these surveys and collect the data from the respondents and the consumers, right.

And then step three is basically about analysing that data and once we have analysed the data, we kind of you know got some kind of mathematical equations which we will use to create a market simulator. In the market simulator, we will be able to answer all the managerially relevant questions like, what would be my market share? And if I launch my product, will it cannibalise my own product? Or how much of market share I'm going to steal from a competitor and things like that. So, let me show you these steps in a very animated form to give you the kind of a big picture view of what is conjoint tool, right?

So, think about the first thing what we want to do is, we want to identify the list of important attributes. And how do we identify the list of important attributes? And that's where the explicit response methods we have learned in other module will come handy, right? So, we want to kind of and identify the set of attributes which consumers really care about. And then we want to look at what levels of attributes can be set in this market, right. So, for example, we talked about the 30K range smartphone, right. So, we are thinking about the attribute would be the screen size. And what are the levels of the screen size? Screen size could be the big screen size or the small screen size and whatever the specifications are. Similarly, the battery life can we offer a 24-hour battery life or the 36-hours battery life and things like that, right? So, using this attributes and list, you can think of you can synthesise or think of creating so many different products, and these products could go, and it's a very large, huge number of possible products you can synthesise. What you're going to do is you're going to scientifically pick few of them? And this is very important. There is a design method which we call the factorial designs or the fractional factorial designs and different kinds of things. We will use that to kind of pick few of these products, right. And that we will call the hypothetical products, right. So, because this is the few products which was from all the potential product offerings can exist in the market, right. And then what we will do is we will look at our target segment or the people who you think would be our target customers. We will randomly select few people, or we can do stratified sampling.

So, we will take the hypothetical products we have created and ask each and every respondent from our target population. Some sample size will be 100 people, that to rank order these products or rate these products or make choices among these products, right. And there are different designs there and then once we do that, that's the data collection process. Then we will analyse the data, for example, depending on how you collected the data. If you have asked people to rank order these products or rate these products, you can use the methods like regression or if you have asked them to kind of definite choose among the alternative products, you can use the logit and multinomial logit and all the classification methods, right.

So, once you have done that, then you get something what we call the mathematical approximation of the consumer's decision-making criteria, right. This is the mathematical equation, which tells you in summary, how this particular consumer makes a decision when he is thinking about buying in this category. So, think about this. This is so powerful. Now, what we are able to do is through this is, that we are able to actually map the consumer decision making criteria mathematically. So, you can imagine once we're able to do that, then because we know how consumers make the decision, we can use that to answer question, we can use that to create a simulator. Now, let me just tell you what kind of simulator.

So, here you think about all the existing products in the market. So just imagine this in the dotted blue circle these are the products which already exist in the market. And you wanted to introduce a new product, which is this green product. Now, you are interested as a manager that what would be the market share of this product?or you are interested in knowing that, already I have the yellow product in the market, will this green product eat the demand from my product, or will it actually, I'll be able to steal the demand from my competitor? Then you might be interested in what

should be the price, I should set for this green product so that, I can maximise my profit. Right. And these are the kind of questions you will be able to answer through the simulator after doing the conjoint analysis.

Now, conjoint, actually, there are two types as I said, depending on how you are collecting the data from the respondents. It could be the rating-based, right? Where you ask people, you show them hypothetical products and they rate these products or you can ask them to rank order these products, right? that this is the best product, this is second best product. So, this is all fall under the rating-based conjoint. And then the other method quite popularly or widely used, is that we show people three products at a time and then they say, "This is the product I like the most". Then we show another three products and they say, "This is the product I like the most", right? And that's called the choice-based conjoint.

Now, how do you collect the data? And that will basically lead to what kind of analysis later you will be able to do. And in this particular module, we're going to focus our attention on the rating-based conjoint. And I have already developed an app for you like you might have seen in the other modules, where I'll walk you through the app that, how to actually design the survey and then how to collect the data and then how to analyse the data. You can do that without getting into the statistics and mathematical formulas and things like that.

Video 4: Selecting Attributes and Levels for Conjoint Analysis

So, as I mentioned, conjoint analysis can be divided primarily into four steps. So, first is, to identify attributes and the levels and design the survey. We'll quickly start from there, to design the survey, what, how should we go about it? What kind of data we need to collect? Of course, before any survey design, you need to understand the context.

So, as a manager, you need to talk to some of your customers, what do they care about and things like that. You then generate the kind of all different kinds of list of benefits and attributes consumers care about. Now, in this particular module, the rating-based conjoint, we're going to talk about it. We are assuming that you have already figured out, the segment you are going to go after.

So, the macro-segment has already been done. What do I mean by macro-segmentation? So, for example, if I'm thinking about launching a smartphone, I could create any kind of smartphone. And the smartphone could vary from five-six thousand rupees to almost you know, probably one lakh rupees. So, what should I do? It's a huge range. So, and as you can imagine, the people who are buying very expensive smartphones, which are more than 50,000 maybe, are not interested in the smartphones which are in the 10K category.

So, that is what I call about the macro-segmentation. So, first you have to identify, who is my, kind of you know roughly, the target segment. And one easy way is, we use this, what they call, the budget constraints. The different people operate under different budget constraints, and that gives you a very good idea of, in the lot of context and

particularly, the durable goods context, that what are the major segments that exist in the market? For example, if you look at the cars also, there are expensive cars and there are just value cars and there are SUVs and things like that.

So, first thing, we will basically, have already figured out as a manager, that this is the segment we are going after. And then within that segment, we did some explicit response or the exploratory analysis to identify what are the four or five or six important features consumers care about. And now, why I'm saying only four, five and six because, if you really think about it, at the end, at the point of purchase, usually people only look at two, three, four options, and they mostly gravitate towards three or four attributes or the benefit.

Although the smartphone might have 100 attributes, but really at the time of choice, people only look at those 4,5,6 important things. You need to identify those. What are those important things? And that's what the explicit response functions basically help you do that Max-Diff design or Kano analysis and things like that. So, from there you're going to identify the relevant attributes. And once you have identified the attributes, you can look at the available alternatives, you look at your potential, what kind of technology is available to the firm, you can think about the levels these attributes can take. For example, prices and attribute, and the levels could be, I can offer a smartphone at 35,000 or 30,000 or 25,000. These are the different levels.

Similarly, when we talk about the battery life, I can offer a smartphone with the battery life, which lasts for 36 hours, or it can only last for 24 hours. So, those are the levels of the attributes. So, I hope you understand the difference between the attributes and the levels. So, once you have figured this out, and again, lot of managerial judgement, qualitative analysis will be very useful to come to this level. Now, let's look at one of the contexts. The context here is suppose, you are a tyre manufacturer. And the tyre manufacturer said, 'Tyre is a very competitive market. I want to offer.' And you said, 'Okay, I see that there is a segment which seems like nobody is catering to.'

This is the segment, the SUV segment. These are the households, who have SUVs and they go off the road trips very often. They want to go for adventure. So, they have SUV. They probably had a small family, and they go out for these adventure trips. Now, of course, they usually, probably will be using whatever tyres are available. Butcan we actually target this particular customer segment and offer them a tyre which speak to their needs.

So, that's how we have identified the macro-segment. Now, once we have identified, then we probably, will want to talk to some of these customers. What are the challenges they are facing, when in terms of the tyre, when they're going off for the adventure trips and things like that? That's where the expert judgments, qualitative interviews, focus groups and things like that will come. And, of course, you can do the explicit response functions also.

To bring out the four, five different attributes, which you think, at the end, are important in the decision-making, when consumers are buying the tyre. So, think about that. So, what are the things potentially, consumers might care about here, for the purpose of the discussion? Just imagine that they identified that, consumers care about the

durability of the tyre. How long it will last, will it last only 30,000 miles, or 40,000 miles or 50,000 miles? Which brand it is, is it the Sears, Goodyear, Goodrich, JK; what brand it is, right? They care about the price of the tyre. Is it a $50 tyre, a $60 tyre, or a $70 tyre? These are the attributes in the consumer's mind, of the tyre.

The tyre attributes are price, brand, maybe the aesthetics of the tyre or the durability of the tyre. But if you ask the product manager, if you say, 'What are the attributes of the tyre?' He's going to talk about the tread area, he is going to talk about the ribs, he is going to talk about the shoulders, he is going to talk about how many steel wires are there and things like that. So, that is what we're talking about.

The product attributes from the engineering perspective is not important. What we really are interested in the product attributes from the customer's perspective, and from the customer's perspective, maybe the steel belt and the radial plate and all these things, they may not even know these technical terms, that the tyre, basically at the end, it consists of these things.

So, but they do care about how long, or the durability of tyre. How much it will last? They care about the price of the tyre. Maybe they care about the aesthetics. So, those are the four attributes we talked about. Now, think about from those four attributes, how I'm going to come up with the levels. So, for example, the tread life here, I'm showing you 30,000, 40,000, 50,000. How to decide what kind of levels I need to set? So, in other words, I can design a tyre which can last only for 20,000 miles, or I can design a tyre which can last for 50,000 miles.

Because remember, we have already identified the macro-segment, we have some sense of, what is the kind of price range these people would be willing to pay. I said price range, not exactly prices. Because $200 tyre is not what this particular segment would be interested in. They know roughly, the tyre costs around $50 to $80 - $90. So, that is the range of the price. Now, once you have identified this, by looking at the competitive offerings, identify what could be the tread life for the tyre, then you can think about setting it. What is the best possible, worst possible? So, 30,000 is the lowest, 50,000 is the highest, max. and min. and the average value. And those are the three levels you're going to set. So, for the tread life here, we identified 30, 40, 50. And for the price, we said, 50, 60 or 70. That doesn't mean that, I'm going to launch products only at 50 or 60 or 70. In the real market, the products might exist, which are sold at 45. Maybe, it existed 55. But this is the kind of range we want to keep in mind, that our products can take these different levels and something in between.

Now, what about the brand? If you look at the brand, brand can take only two or three values. There is no intimidate value possible. So, here it's a discrete variable in itself or the side wall colour. So, there's only two possibilities black or white. And again, this is something which you need to know, whether your technical team will be able to design a tyre, with the white wall or not. If not, then there is no need to test something like that, which is not even feasible to design. So, once you have figured this out, the important attributes and the levels of the attributes, then what you will do is, you will feed this information into the conjoint app, and then the conjoint app, basically will give you the survey design, which you'll take to the consumers, and then they will rank order those products or rate each and every hypothetical product, and then you collect

that information, and we can use it, feed it back into the app, and then, that will give you the analysis. right.

Video 5: Designing a Conjoint Survey

So, once we have figured out, what are the important attributes consumers look at when buying a tyre? So, in this case, tread life, durability, brand, the side wall, and the price are the four important attributes which consumers care about when buying a tyre. And then we figured out the levels of these attributes based on what is the best possible value the attribute can take or what is the lowest value it can take or what is the average value it can take. So, for the tread life we said, okay, it can take values of 30, 40, and 50 and brands are Sears, Goodyear, and Goodrich and similarly the sidewall could be black or white, and the prices can range from $50 to $60 a tyre, right?

So, then, if you think about number of products, I can synthesise using this information, so the tread life can take three values. The brand can take three values. Price can take three values, and the sidewall can take two values. That's 3*3*3*2, 54 different products I can synthesise using just these four attributes and the levels it can take. So, what I will do is I can actually create those 54 profiles and ask respondents to rank order those profiles, right? But the 54 is a such a large number, right? It's very difficult for people to actually when they are rank ordering or rating these profiles to be involved with this exercise.

So, is there some way we can actually reduce the number of questions or number of profiles we want our respondents to answer? And the answer is yes. We can use the fractional factorial design to reduce the number of profiles which we'll take to the respondents for them to rank order. So, what we will do is we will convert that into a coding system so that we can use the factorial design. So, attribute 1, attribute 2, attribute 3, attributes 4, whatever the levels, it can take 0, 1, 2, and then we'll feed it into the algorithm.

And that algorithm will basically select the best optimised number of questions or the profiles in the sense that if we ask only the smaller number of questions to the respondent, the kind of information we will get is as good as if we would've asked them to rank order the 54 profiles. Now, of course, this factorial design itself is a topic of itself. So, we're not going to go into how to really think about designing the factorial design, instead, what we will do is, I have developed the app. We will use that app to actually do this particular part of the exercise.

So, what we will do is, we will feed the app the information about what are the attributes and what are the levels it will take and then it automatically will give us some fewer number of profiles. In this case, I suppose it will give me 18 number of profiles which are good enough for me to collect the information from the respondent. And then what we will do is we will take those 18 profiles and ask the respondents to rank order or rate these profiles. And using that information, we can continue with the exercise. So, let me walk you through that app**.**

Video 6: Conjoint Design App

Let me walk you through the Conjoint Survey Design app. This app will help you design the conjoint survey. The input it takes is the different attributes and the levels those attributes can take. So, that will be your input. And once you input that, you will get the conjoint survey design. So, for this, we're going to use the example of the tea category. So, here I have a sample data for you. So, download that data, and once you download that data, you can open and this is how the data looks like.

So, data in the tea category; researchers have identified that these are four attributes which are important for the purchase decision: price, variety, kind and aroma. And these different attributes can take different levels. So, for example, price; what is the minimum possible price and maximum possible price? What is the average price? So, that's how they decided that the price, we will test the three different levels for the price. For the variety of the tea, whether it's a black variety, green variety or the red variety. And for how it is packaged, for example, it is packaged in the bags or is it the lose granulated? or is it a leafy kind of tea?

Whether the tea has aroma or does not have aroma? So, it can only take the two values and we will leave this cell empty. So, this is the kind of data you want to input in the conjoint survey design app. So, let's input this data. You have this button here: browse, and the data which you have downloaded just pointed towards that. And remember, it should be in the CSV format.

If it's in the excel format, please make sure that the data actually saved in the CSV format. So, once you upload the data, it will show up what you have uploaded. So, for example, we remember we had four attributes and the levels of these attributes, and then the app basically will do the calculations in the background and give you the best possible profiles, which you want to ask the response to run these profiles. So, remember, there are four attributes and the attribute one can take three levels, two three levels, attribute three also can take three levels and attribute four can take two levels.

So, the total number of profiles of the products you can synthesise is three times three times three times two, which is 54. But the 54 profiles are too many for any respondent to kind of rate or give their preferences for. And that's what the factorial design actually is, helping you figure out what are the less number of profiles, which you can ask the respondents to rank, order or rate, and that will give you the full information. So, factorial design in this case have given you 12 profiles. So, in the survey design tab, you can download the survey, right. And once you have downloaded the survey, you can ask respondents to rank order or rate these different product profiles.

So, here I give you one example where, basically, we asked the five respondents to kind of rate these profiles on a one to 10 scale. So, the profile one was rated very high by respondent 1. profile two and three were rated less and respondent two also rated all the profiles. So, every respondent will rate all the profiles, you collect this information, you input that data into the excel sheet in the CSV format, and then once you have that, you can actually run the conjoint analysis app.

But this app is about, kind of giving you, the design; how to choose the different profiles from all the 54 possible combinations or whatever number of combinations depending on your study. It basically reduces the number of products, which you need to take to the respondents to kind of rate those products, right. So, you'll download the survey and for each new profile, potentially, you will create some kind of card and ask the respondents to rate those cards. Or in another way, what we have discussed in the class.

Video 7: Data Collection

So, as you have seen in the app, that once we feed in the number of attributes and the level information into the app, it gives us the best possible number of reduced number of profiles which we can take to the respondent for rank ordering or rating, right? So, for example, in one case, we got the 18 profiles. Instead of 54 profiles, theseare the 18 profiles. If we take and ask respondent to rank order or rate, that will be sufficient for us to do the calculations.

But before we take this to the respondent, I want to talk about few things that how should we collect the data? You shouldn't actually take the profiles as coming out of the app and directly ask people to rank order them. Rather try to be a little bit creative here, right? So, try to create the cards which represent each and every profile. You have to tell them some stories so that they are in the context when they are thinking about buying this category, so that the information you are getting from them is more realistic in nature.

So, two things to remember here during the data collection process that you don't directly show them this kind of excel sheet and ask them to rank order, that's not a good idea. Rather, what you do is your kind of, you know, maybe create a card like this. You can create 18 different cards with the pictorial representation, or, if possible, maybe they physically synthesise those products so that the consumers actually can understand the products a little better. So, that's one. And the second thing is always make sure who are you collecting this information from?

And they should be your target customers, right? It should not be that you have created a, say, for example, you are thinking about a smartphone of 60,000 rupees and then you are actually talking to maybe the people who can't even afford the 60,000 rupees smartphone, right? So, you have to carefully think about who are the respondents who potentially are your target customers. So, these are the two important things you want to remember when you do the data collection.

Video 8: Analysing the Data

So, once you have collected the information from multiple respondents and remember, each and every respondent will rate all the profiles which you present to them. And once you have that, you're going to feed that information back into the app. But let me walk you through what's going to happen. So, this is the step three of the analysis, where we have already collected the data. Now, we have to analyse this data. And the

sample size could be depending on what category you are and how many respondents you.

So, for every respondent, you will have the rank ordering or rating information. So, what we will do is, we will do the regression method, to analyse this data. For each and every respondent, we're going to run a regression. And in the regression, the Y variable would be the ratings or the rank ordering of those respondents, and the X variable would be the product attributes of the levels, which we actually asked them to rank order.

So, this is what we call the dummy variable regression. And the equation looks like this. Once you run this regression, it will estimate the beta coefficients for you, and we're going to use those beta coefficients, to make sense or interpret these beta coefficients. So, as I said, we're going to use the app to actually analyse the data. But you can use the excel and the 'built-in' function in the excel to analyse the data. You can set up the dummy variable regression, which I'm showing you on the screen. And you can do this regression for each and every respondent in the excel sheet itself and compute the beta coefficients for each and every individual.

So, once you have the beta coefficient in the excel, the output may look like this. Then the next question is how to interpret worth; can we make sense of these numbers which are coming out of the regression output? And here is my take on that. You can interpret these numbers, but I would encourage you not to do that. Directly trying to interpret these beta coefficients, invariably lead to some kind or the other confusion because the scale on which these beta coefficients are estimated, are not the kind of scales which we are usually used to understanding the numbers.

So, what rather we do is, we try to change this into something. By the way, these beta coefficients, who are about to come out, I'll call the part-worths. So, this is the kind of equation for one respondent you will estimate, and intuitively what this equation is telling you, you have actually figured out the decision-making criteria of the respondents. This is the mathematical equation of how respondents actually make decisions, when purchasing in this category. So, this is the intuitive interpretation of these beta coefficients.

Now as I said, instead of directly trying to interpret these part-worths, the beta coefficients which are coming out of regression, we transform them into an importance rating. So, how do we transform them? We look at each and every attribute. So, remember, the durability was one attribute; the tread life, which we call. Price was another attribute.

Brand was another attribute. So, we have got the beta coefficients for each and every attribute. For the brand, for example, Goodrich, there is a coefficient related to that is zero. For the Sears brand, the coefficient is 2.26, and for the Goodyear, the coefficient is 2.9. So, what we will do is, for a single attribute, we will look at the maximum part-worth of that attribute and the minimum part-worth. So, in this example, the Goodyear has a 2.9 number, which is the maximum, and the zero is the lowest. In fact,if you'll see, zero is appearing for each and every attribute because in the dummy variable regression, we use that as a base variable. But that's the technical detail.

You don't have to worry about that. In fact, in the app, what I have done is, I have done this also for you, that automatically app will take the respondents, run the regression in the background, compute each and every respondent's part-worth, and then compute the importance rating for them. But still, you want to understand what's going on under the hood. So, once you have estimated the min. and the max. level of each and every attribute, what you're going to do is you're going to normalise it.

So, in other words, if you look at the brand, the minimum value takes zero, the maximum it takes 2.97. And similarly, for the price, the minimum value takes zero and the maximum, 1.62. And for the tread life, the minimum value was taking zero and the maximum is 3.44. Add it up. That adds up to 9.28 and you use the 9.28 to normalise all these importance rating. And then what you will see is something very interesting.

Now, you can actually interpret the importance rating directly. It gives you the sense of how important different attributes are in consumer decision-making criteria. For example, if you look at the tread life, it is 37%, so, you can kind of you know make call that, for this respondent, when he is thinking about buying a tyre, in this case, the tread life or the durability of the tyre is 37% important. And what about the colour?

Colour is only 13% important. And what about the price? He doesn't look like he's price sensitive, rather he's sensitive to the brand, 32% and sensitive to the tread life, which is 37%. So, that's how you will see the different respondents actually are different. So, that's where you will start seeing that some of the respondents' care about the price too much, some of the other respondents' care about the quality in which, in case, we can think about the assessing tread life and the brand, lot more.

So, that gives you the first snapshot of how the respondents care, and what are the things different respondents care about, in the category. But still, what we were really interested in, after doing all these exercises, remember, so that we can estimate some kind of a you know a market share, if we launch the product; this kind of product, what kind of market shares we can expect and where this extra demand will come from? Is it going to be coming from my competitor, is it going to come from my own product, so on and so forth? And for that, you're going to basically do the market simulation.

Video 9: Simulation and Market Share Estimation

So, now comes the most exciting part. Using all the step one, step two, data collection and then step three analysis. Now, we are ready to make a simulator or answer managerially relevant questions. What are the managerially relevant questions? For example, managers want to know which brand has the highest brand equity?

Managers want to know how much of the premium Goodyear commands over the Goodrich or whatever his brand is, right and they want to know in a particular market, if these are the products available in the market. And if I want to launch a new product, what will happen to the new products market share, where this market share is going to come from? Is it going to come from my own brand or is it going to come from a competitive brand? All these kinds of questions you can answer through simulation, right? Not only that, you can answer questions like okay, what should be the good

price for this product, right? what is the price which will maximise my profit? or what is the price which is going to maximise my revenue? depending on what your objectiveis. So, you can answer all these questions through the simulation. So, let me walk you through what is happening, actually, under the hood, in the app when they we're trying to do these calculations. So again, market simulator, you can think of is a three-step process, right? Step one. You calculate the products utility, right. Using the equations, you have calculated. For each and every product and for each and every respondent, you can actually compute the utility using those mathematical equations which we have estimated.

And then step two, using that, we're going to compute the, each and every respondent's choice probability. So, suppose I have three products in front of me. What is the kind of you know a probability that I'll pick product one over product two, right? and then what we will do is, we will sum up all these choice probabilities to come up with the market share.

So, here is how it works for one respondent. As I said, suppose there are these three products already available in the market. The product one is Goodyear, it's basically it runs 40,000 miles. It's priced at 60 dollars and it's a Black Void and there is another product from Goodrich, which is 30,000 miles durability. It's offered at $50 and it is White Void. And there is another product by the Sears, in this, catering to the same market, which is of 50,000, it can run for 50,000 miles. It's offered at $70 and it's Black Void. And then Goodrich is thinking of launching a new product, which actually has little higher utility than its current product. And it's thinking about launching it at the same price, right? And instead of White Void, this product will be the Black Void tyre.

So, what you can do is you can actually compute the utility, and you already know the part-worths of the every respondent. You know that, okay, what is the composition of the product. For example, if you look at column one for the Goodyear, you will see that the Goodyear is marked as one. So, out of this Goodyear the brand is an attribute and it can take three values. Goodyear, Goodrich or Sears, right?

So, that's what I have written. One row, it corresponds to Sears, another row corresponded to Goodyear, another row corresponded to the Goodrich, right. So, you see the first column for the Goodyear and you look at the corresponding rows for it and you will see for that good year 40,000 miles, $60 black, you will see that the appropriate row has been marked as one and the other ones are marked as zero. Andyou can multiply the part-worth column with the product column. And that's how you getto the utility, right?

So, you can compute the utility for each and every product and from there you can compute the probability shares, and here, the idea of the probability share actually is grounded in the econometrics. Some of the brilliant work done by ProfessorDaniel McFadden. He got the Nobel Prize to come up with these discreet choice model. He worked in this area quite a bit and again, as I said, I'm not going to go into the details of econometrics of how this model is developed, but at the end, in terms ofcomputation is pretty straightforward.

Once you have computed the utilities, you can take the exponent of utilities and again, kind of you know using this formula, you can compute the each and every respondent's choice probability. So here, I am showing you the calculation for in the old market where only product A, B and C were present. What is the choice probability for this particular respondent? And when the new product will be launched, what would be the choice probabilities for this respondent? Again, this is at the respondent level still, right.

So, here you can see the, for this particular respondent, the new product is not very attractive, right? So, although, in the old market he would have preferred the product A because the choice probability of picking the product A is 74%, vs in the new market is still his preference for the product A is pretty high, 71% compared to the new products kind of you know choice probability is 0.05. Right. But there will be another respondent for whom this new product might work out to be very well, right. And that's why we need multiple respondents. An average probability of across the multiple respondents give us the idea of what the market shares look like.

And again, here for the purpose of the class, I'm just showing you this respondents, I'm assuming that this is the only respondent in the market. But clearly, you understand that if you average the choice probabilities across multiple respondents, that's how you calculate the market shares. And then you can estimate okay, if you're launching this new product, what the market share of the new product will look like. Okay, which is highlighted in the kind of you know yellow bar here.

So, this is the whole process. But again, to make the life very easy for you, I have already coded all these things into the app. So, let's go to the app and see how the app basically, I'll walk you through different tabs in the app and where this information is present.

Video 10: Conjoint Analysis App

So, let me walk you through the Conjoint Analysis App. So, once you have collected the survey data, this app will help you analyse that data. To walk it through the app, we have the sample data which is collected for the tea survey, right? So, download that sample data, and if you open the sample data, what you will see is, this is how it looks like. So, you have 13 profiles, and for each and every respondent rated these profiles, on a 0 to 10 scale.

So, for example, respondent one rated profile one as eight and rated profile two as one. So, that means the profile one is much preferred over the profile two. And in basically every respondent rates all the profile on zero to 10 scale. So, in this app, the input data should be in this form, right? So, you should have the profiles, profile numbers, then you should have these attributes. In the tea case, there were four attributes: price, variety, kind and the aroma. And these are for each and every profile, what the product profile looks like.

The description is here, and then given ratings of all the respondents. So, in this case, we have 100 respondents' ratings, right? So, once we have this data, we save it in the CSV format and then upload that data into this app. So, you point this, click the browse

button and then point it towards where your data file is. So, once you do that, the app will automatically calculate all the required things for you. So, first thing you will notice is that it shows you, okay. How many profiles were used in the survey? What were the values of different attributes right for each profile, then it tells you how many respondents were surveyed and what were the ratings of those respondents?

And then in the background, it does the analysis so, you can estimate the part-worth utilities. So, you click on that app. It will do that calculation for you. And there you can look at for each and every respondent. Now we know how the part-worth utilities look like. But more importantly, it basically tells you what do people on an average care about when they're buying the tea? Do they care about the kind or do they care about the price or do they care about the aroma or the variety, right? So, on an average, right.

So, it gives you the idea of you know what the respondents think about. But more importantly, it gives you this information about what people care about in this product category at the respondent level. So, for example, respondent one cares about what kind of tea it is? whether it's granular or is it leafy. And, if you look at respondent four, he cares most about the variety, right? So, where It's a black tea or green tea or as a red tea, right? So, different respondents care about the different things, right? So, that gives you the sense of, you know, there is a lot of heterogeneity in terms of what people really want in it. So, that gives you some sense of how the market looks like forthe; what are the preferences across consumers when they are buying a tea. Now, the next tab basically helps you do the market simulation.

To do the market simulation, what you're going to do is, first look at the real market where you're thinking about launching your product, right? So, what you will do is, you'll say, "okay, already I know in the market there are suppose three different kinds of products are already existing. could be three, four, five whatever that number is." So, for example, suppose in a particular market I identified, there are already four different competitors operating, right? So, what we will do is we will kind of try there are 54 possibilities given to you.

So, what you will do is you try to identify the closest profile which matches the competitive offerings. So, for example, in this case, suppose we found that the product one, product two, product three, product four are the four profiles which matches the competitive offerings. And suppose in this market I wanted to launch a product 20 for example, right? So, this is so, I can actually see what if I launch product 20, what would be the market share of that product would be, right. So, that is, this app basically helps you understand that. So, instead of product 20, if I launch product 36, what kind of market share I can expect, right? So, you can kind of, think about in different markets what kind of market shares you can expect.

Now, this app can also help you on few more things, right? So, it can actually help you. Remember, when we look at the part worth and the importance rating, different people cared about the different attribute when they're buying in this category. So, we would segment the market based on that information. So, this tab basically helps you do that. So, what you will do is you say, okay, the first information is that statistical

criteria. Given that information that there are people who care about the different things in the market.

Let's see how many different segments exist in the market, right? This picture tells you that. Okay, if I segment the market based on what people care about, statistical is telling me that there are two segments, two different kinds of people exist in the market. So, across these two segments, what are the kind of what are the consumer preferences? What the market shares look like? For example, if you look at the market share for segment one, your product 20, which you; or product 36 which you wanted to launch basically will have a product 36, will have this much of market share in this segment one, 30- 40 %.

But for segment two, you will see that the market share is only 8.13. And then segment three is 8.94. And that same information you can look at visually in segment one, we have large market share in segment two that market share is small and for segment three, that's because segment one prefers something versus the segment two. So, if you look at the segment one's preferences, they care about the price, there's a very price sensitive segment, right?

So, because if you see the important rating for the price is very high and the segment two if you look at, they care about the price and the type of tea is both are very kind of, you know, important criteria. And segment three cares a lot about the type of tea. And that's why you see that different people, once we divide the market in different segments, will basically attract towards a different kind of products, right? So, here you can kind of download the segment level part-worth and segment level importance rating information and to kind of in a get the insights from what kind of preferences are in the market.

Now there is one more tab which will basically help you understand how these segments look like for that, if you have collected the demographic data for the respondents, you can actually get that sense also, right? So, download the sample demographics data, right. So, sample demographics data is like this; It'll look like, basically for each and every respondent we have collected more information beyond what their preference for the profiles were. We also collected the information about how many times they drink tea in a day. What is the age of a respondent? What is the gender of respondent? Whether this respondent is coming from the high income or medium income or low-income group, what is the marital status and how many children they have?

So, if I have collected this kind of information, I can upload it here, right. So, I can upload that information. And then I can look at the different segment, right? The segments which we have created there; how they differ across these different demographics in terms of demographics. For example, segment one, if you look at the consumption of tea, is there are a lot of people who, there are 15 people who consume twice a day and there are some people who consume quite a lot of tea, right?

So, similarly, if you look at the age profile, how these age profile looks for segment one, right? So, how many people are below 20? How many people fall between this and then kind of in gender? how many females are there? and how many Males are

there? And if you change the segment, you can look at for another segment, how this profile looks like and for another segment how this profile looks like now. So, depending on the segmentation, these average values will be different. In this case, I have just simulated the data, so, it might look very similar.

But in general, this will help you identify, "okay, the segment one people who are very price sensitive." Actually, if you look at those prices to consumers, if you look at the demographics most of them say are female or most of them are male, right? or mostof them are falling between the age group of 40 and 60, right? So, that gives you the sense of you know, who are these people? Who should I target? I suppose I am launching a product and I'm very good at, for example, I'm very efficient in bringing down the cost. Then I kind of get the idea, okay, I should launch a product at lower prices and then that will have a larger market share for segment one, because these are the people who are more price sensitive, will gravitate towards the kind of product which I'm offering in the market, right.

So, that gives you some idea about how to target, right, how to reach to those customers. So, these are the few tabs just kind of, you know, with the sample data sets; play around with this tab to get the answer of what kind of products probably will work, what kind of market shares you can expect. And you can do all kinds of simulation in terms of in particular market. These are the three or four or five products available in some other markets, different kind of products might be already existing. And in this market, suppose you wanted to launch product 36 or product 20,what kind of market shares you can expect? So, you can do this simulation in this app very easily.

Video 11: Module Summary

So, I hope you got the good sense of the power of Conjoint. The conjoint analysis is a very powerful tool and particularly very useful for incremental product design, right? But however, be careful. It doesn't work very well when you're talking about the radically new products. And the reason is because the conjoint critically depends on the consumer's valuation of these products and profiles, right? And the less information they have about the product, less experience they have about the product category, the less reliable your information will be, which is coming out from the respondent. So, that is the weakest link.

Otherwise, there is nothing in the conjoint analysis itself which you cannot use for the radically innovative products. The only part is how you're going to basically present this information to the consumers so that they can actually understand what the product is and evaluate across different products, right? So, in fact, it's not like you cannot use it for the radical product. Ten years back, I have used this particular idea to understand the consumer preferences and the electric vehicle policy for the government of India, that project. But again, you probably need a help of an expert who knows how to kind of customise this particular tool so that it can be taken to the completely radically new products. But in general, for all practical purpose, what you have covered in the class is a very good tool and we have already have the app.

So, you should be able to actually do this for your products and things which you are thinking about launching. The best part is, it answers the toughest question. What is the toughest question for a manager who is launching a new product? Two tough questions. If I launch this product, what kind of demand, or what kind of sales I can expect? What kind of market shares I can expect? And the second tough question, is how to set the price of the product. Not only that, conjoint actually helps you figure out what is the best attribute level that will actually be most profitable for you, right? It can help you extend the product line, and it can also be used for a lot of other things, right? For example, setting up...not only setting the price, the setting up the different levels of other attributes.

But remember, when we were doing this whole exercise,we have not incorporated a lot of information which also affects the demand. For example, what kind of promotional activities you're going to do with the product, right? That will have an impact on the demand, right? What kind of advertising you are going to create that will have an impact on the demand? So, use those judgements to correct for whatever market shares which you are estimating from the conjoint analysis used managerial judgement to figure out, Okay, okay.

The conjoint is telling me that this kind of market shares I can expect. But, that kind of, you know, assumed in some sense that we will be doing the advertising level as much as probably what the competitors are doing and so on and so forth. See the other thing very important for you before you get into the conjoint analysis is, completely have the understanding of the context because again, the conjoint analysis what we covered in the class, it's like kind of a basic conjoint analysis and here the number of attributes we chose are limited, right? Four, five or six.

So, first of all, you have to figure out what are those four, five or six attributes which are really important for the consumer, right? and for that, you need to talk to your customers. Some of the customers, do in-depth interviews, figure out what are their motives, right? what are the other kind of alternatives if they buy in the product category? how do they decide about what product to buy, right? howdo they make choices, right? By talking to them, you will get a very fair idea of whatare the things which are important for them. Using that, you can figure out what are the important attributes which you need to include in the conjoint analysis.

Last but not the least, I have to again remind you that the conjoint works very well for the incremental products but doesn't work for completely disruptive or radically innovative products. And I hope you got the good understanding of how to use the conjoint analysis to answer some of the very tough questions which usually for the new product launch managers struggle with.