

ISB- Product Management

Week 7: Understanding Consumer Preferences

Video 1: Motivating Example

Welcome friends. This is the module on understanding consumer preference for the Product Management course. I'm going to start this by this simple motivating example. In 1995, DuPont introduced the Alathon 25, a polyethylene resin. It was designed to compete with the resin currently available in the market, which are used for the flexible pipe manufacturing. And the farmers use these flexible pipes for below ground irrigation system.

Now, the question here is for the DuPont is, how they have to estimate what kind of pricing they have to do for this product, right? And for that, they need to understand how consumers are going to derive a value from this particular product. So, think about for a second. How are you going to think about what is the value in the economic terms, farmers derive from this product? To understand that let's go back to the economics. In economics, the consumer choices are supposed to be driven by the consumer surplus. And what is consumer surplus?

Consumer surplus is simply defined as the economic value consumers derive from the product. The benefits from the product over its lifetime minus the price they have to pay for it. And when consumers are making choices, they look at this particular metric. So, which product actually is offering me more consumer surplus vis-a-vis the other product, whichever product offers them a better consumer surplus, that's what they purchase? So, it's important for the firm to understand how consumers actually compute a consumer surplus. And now, when I say compute, they have some kind of a notion in their mind by which they try to understand which product is better for them, and which product probably is not that good, right?

And that's how they make the choices. So, again, in economic terms, the consumer surplus is defined as the total benefit consumers derive from the product, minus the prices they pay. And that's the core driver of the choices. Now, here, when we talk about the economic benefit, just remember that the economic benefit, the way we're going to define it is actually the maximum price consumers are willing to pay for the products or services. And that maximum price will depend on the total benefit they're going to derive from them, right? So, coming back to our example, in the DuPont's case, how can you estimate this value?

So, think about this product. What is it bringing to the table? How is it different from the current offerings? And here, the DuPont's claim is, that the pipes made of this new resin are more durable. Their failure rates are much lower compared to the leading alternatives in the market. So, this is the product feature. But how it translates into the consumer benefit? So, think from the customer's perspective, from the farmer's perspective. What does high durability mean?

High durability means that there will be less chances of failure and then because otherwise, when the failures happen, they have to basically relay the entire pipes again. There could be the damage to the crops. There is a cost of replacing those pipes. So, all these things, right? So, in this particular case, the durability is translated into saving in the labour cost of replacement, saving in terms of less damage to the crops, and so on and so forth, right? And you can actually estimate that in the economic terms.

So, now the very fuzzy notion of the durability is kind of taking shape in terms of how to estimate the value of that durability. And as you can imagine, different farmers and different customers will derive a different value from the same product, right? So, in this case, for example, just imagine in particular market, the current alternative is selling at \$6.5 per 100 feet, right? Now from there, you can compute, okay, if my product is more durable and it lasts kind of, instead of 8% failures, it's only 3% failure. So, you're going to save some cost in terms of replacement, right? Because you have to buy these products less often. And that value, you can compute $6.5 \times 5\%$, you can think about there will be cost saving in terms of because you don't have to replace these pipes so often, and the replacement cost opposes your estimated \$60, 5% of that is the saving, is the benefit farmers are deriving.

Then you can think about if they use the current alternatives, the failure rates are higher, and when they're using this new one, there will be less damage to the crops, and depending on what is the cost of the crop. You can compute the benefit they derive from using the more durable pipes, right? So, that's how, when you can compute all the benefits in the economic terms, and then add it up, and that gives you the total benefit they're going to derive from the product, right? And that is what we define as the economic value.

At the core of it, the first thing you have to identify is, if consumers do not use my product, what is the alternative available to them, right? So, if this particular DuPont's pipes are not available, so currently they are using whatever alternative they have. What is the price of that alternative? That price becomes your reference value. And all the benefits consumers derive on top of it because the pipe is more durable are kind of positive benefits. You can add up all these things, and maybe in certain contexts, your product is not as good as the competing product in certain dimensions.

So, you have to compute that value also and subtract that from the total value. And that's what's basically gives you the nice framework to figure out what a fully informed consumer will be willing to pay for the products. And that basically takes into account the competition in, right? So, because if you slew, the economic value is not an abstraction. It all depends on the current available alternatives in the market.

Video 2: Module Overview

So, the DuPont example we looked before this was relatively straightforward in the sense that we only looked at one particular aspect of the product, that was the

Durability and then using that aspect, we try to compute what is the benefit consumers derive from having a more durable pipe? But in general, you can imagine that the products firms are selling are far more complex, they have multiple attributes, for example, think about the smartphone. How many different attributes smartphone has? Right? So, people might look at, you know, how much is the RAM in the smartphone? What is the storage capacity of the smartphone? What brand it is? How much the battery life is? Maybe some other people are interested in what is the camera quality? How many pixels it offers? Screen size? Is it big, small? Right? Warranty?

If you think about so many different dimensions you can identify in the smartphone. Now, not only that, when you look at the different consumers, different consumers might value these things differently. When I'm buying a smartphone, I'm interested in the quality of the camera and the screen size is very important dimension. And for other people, the other dimensions might be very important, right? They say, I want the smartphone to have a high processing power, high RAM, higher storage, right? Some people might say, "All this is fine." I want a smartphone which is from the particular company, right? For example, I like iPhones, right? So, I'm not going to consider any other phone which is Android based. So, the question really is can we figure out in a product what are the different dimensions, right? So, all these are different attributes, but these attributes at the end have to be translated from the customer's perspective in terms of the benefit. So, the first thing is, can we quickly figure out what are the different dimensions? And here I'm going to give you this value triad. Largely, you can think about there are three kinds of benefits consumers can derive from the product, right? One kind of benefit is that it helps them reduce the cost. And in the B2B setting, it could be the acquisition cost, possessing cost, usage cost, performance, reliability, and maintenance, and all these different kinds of cost. And maybe your products, when they are durable and you're offering them warranty or timely service and all these things, they help them reduce the cost of inventory and things like that.

The other dimension could be that your product might be helping the consumers in terms of the top line, in terms of gaining some revenue. And that's where all these software as a service and which basically helps you improve the performance. And it might help you increase the market share, right? It might help the firms actually deliver these products to the consumers better, right? Either the product might help firms to reduce their costs, or products might help firms to improve their top line, right?

So, these are the two dimensions, primary and then, as you can imagine, in the B2C spaces, there are a lot of benefits with a psychological in nature, right? So, people do care about the aesthetics of the product. People do care about the safety. They care about the brand. They care about the assurance, prestige, reliability. All these different dimensions are also important when consumers are thinking about buying the products. Now, in the DuPont case, we looked at the durability. And you can think of it was close from the B2B setting because largely, when the farmers are

interested in buying these underground irrigation pipes, they're not looking at the aesthetics and the psychological benefits of the thing. They are mostly using it for the business purposes, right? So, we looked at one particular dimensions and kind of looked at how that translates into the benefit. But think about the smartphone, all different dimensions. How you're going to compute all these values, right? But before that, the question is, what we talked about is different consumers value different things in the product, right?

So, how can we actually first assess? What do consumers care about? Okay? And that's where the explicit response approaches come very handy, right? We can actually talk to consumers. We can have focus groups and interviews and try to understand what do they care about in the product. We have more systematic ways to collect that information through rating scales, paired comparison, constant sum scale, max diff, right? We can understand there are methods to understand the latent preferences, and we're going to talk about all this in today's module.

So, in the today's module, we're going to talk about some of the very widely used explicit response methods. We're going to talk about the Kano Analysis and we're going to talk about the Factor Analysis. And largely, once you go through this module, you will be able to understand how, through the Explicit Response Functions, how can you understand which consumer, and what features are important for different consumers, right? That will help you prioritise the product development, right? That when you are thinking about creating a new product, you can figure out, okay, because the consumers value the camera a lot in the smartphone, I should be actually offering a product which is in the high-resolution camera, right?

Because all these different attributes might be leading to the similar kind of benefits consumers derive. So, what is the latent structure? Are there latent constructs which consumers are really interested in? What are those, right? So, the learning objectives of this module is to list the most important features that are considered while choosing the product using the Explicit Response Methods. Prioritising the features of a product that satisfy the consumer needs by using the Kano analysis and discovering the consumer latent needs through Factor analysis.

Video 3: Understanding Consumer Preferences: Explicit Response Methods

One of the very obvious ways to understand what consumers care about is by talking to the consumers, right? And usually, if you're talking to 20 to 30 target customers, interview them. Either through in-depth interviews or you can bring them as a group together and discuss about the product features and the available products in the market, what challenges they are facing, and so on and so forth.

You will be able to identify the things what they really care about. But here is the thing which I want to kind of highlight here is that, just talking about what consumers desire, what their purchase motives are, usually do not get to the depth of the problem. So, instead of just asking them, 'What do they desire?' And 'what are their motives?' Rather try to focus on what kind of challenges they are facing when they are

consuming in this category, right? Instead of asking them what they want? Rather, ask them, what are the challenges? What are the problems? And that way you will be able to actually identify some of the hidden needs, which actually can help you develop better products, and pretty much, I'm not going to spend a lot of time, and how should you interview the consumers.

But I'll give you some kind of pointers, right? How? When you're talking to their customers, what kind of questions might help you bring that thing out, right? So, you can ask consumers, what kind of associations consumers make when they are buying these products, right? What kind of problems and defects and complaints that the consumers associate particular brand with, right?

You can think about what are the major criteria they use when they're thinking about buying a product in this category, right? What their past purchase and experiences were when they went about in this category, right? So, this will give you the good sense of what do they care about. And again, this is very exploratory in nature, and this is no quantitative method, it's just trying to understand from the customer's point of view, what do they care about?

But we do have a more explicit methods, which we use to identify, or rank order the preferences of consumers, or the attributes they care about in the product. And that, so one is the Explicit Response Approaches, and the other is the Implicit Response Approaches. So, we're going to talk about the Explicit Response Approaches; and in the Explicit Response Approaches: we have rating scales, rank ordering, constant sum scales, magnitude estimation scales, and I'll show you the examples of that. And, then we have some kind of a Paired Comparison and Max-Diff Design and things like that. They all fall under the Explicit Response Approaches.

So, let's look at some of the examples here, right? So, for example, you might have seen this, and some of you might have already filled this kind of surveys where the consumers basically are asked on a different dimension of the product, how much they really care about the product. How important is this product, right? It could be the 5-point scale, or 7-point scale that consumers will say, okay. Suppose you think about the restaurant services. What do you care about in the restaurant when you're thinking about choosing a restaurant, right?

So, there could be things like prompt greeting, overall cleanliness, comfortable environment, server's attentiveness, quality and the taste of the food, different kinds of cuisines which are offered in the restaurant. Right? These are all the important things; consumers might think about when they're thinking about which restaurant to choose for a particular occasion. So, and different consumers might have a different preference. And that's why, we want to understand that what are these preferences. Do consumers differ in terms of what do they care about in the restaurant services, and how do they differ about it. So, what we can do is we can kind of get this list. And again, this list comes from your in-depth interviews, by your understanding of the context, right? As a manager, you know a lot about what the product context is, and using that information and the consumer interviews, you can come up with the list of attributes which you think, consumers might care about. And, then you can use the importance rating scale to identify which are the important ones. Right?

Similarly, you can use instead of asking them to rate each and every product attribute on a 1-7 scale: whether it's very important or less important. You can ask them to rank order these things, that what do you care the most. right? Then they will say okay, cleanliness is number one for me, and the second is the taste of food and so on and so forth and that is called the rank ordering scale. Or you can also kind of get the same information from the constant sum scale, right? Where you say okay, and these are the 20 attributes which consumers think about when they are thinking of choosing the restaurant.

And then, you can ask them to allocate total 100 points across these different attributes in terms of their importance or you can go for the magnitude estimation scale, which is a little refinement of the constant sum scale. Here, instead of asking them that you have 100 points and allocate across different attributes, in the magnitude estimate scale, what we do is we say okay, these are the attributes which we think are useful, in terms of the... when people think about choosing the restaurant, and just imagine that the server friendliness is 50 points then compared to that, how much you think is the overall cleanliness is in your terms when you're thinking about choosing the restaurant. So, here you are anchoring them to one particular attribute, and related to that you're trying to estimate which one is more important, which is less important, right?

And then, of course, the other method quite widely used is the pairwise constant sum Scale, where you show them two attributes at a time and ask them to allocate the 100 points between these two attributes. And you can show them the pairwise a lot of attributes, right? Or you can just ask them to kind of, you know, instead of allocating the points, you can say which one is... between these two, comfortable environment and the server attentiveness, which you think is more important. Right?

And, then you can show them another question, pace of meal or receive bill in timely manner, which one is more important for you. Right? And then, there is a better version of it that is called the Max-Diff design in which, instead of asking the pairs, we basically asked them a set of four attributes. Right? For example, in one set, we can ask them out of these four attributes, which one you think is the most important, and which one you think is the least important. Right? For example, of one set of question could be between the temperature, server friendliness, server attentiveness and prompt greeting, which one you think is the most important for you, and which is the least important for you.

And then, you ask them a second question, which is the second set, between the server attentiveness, taste of food, server attentiveness and the overall cleanliness, which is the most important, which is the least important. Now, you have to create all these different sets and there is a method to do that. And we'll talk about that in a minute. So, how to create these sets? And, then the question comes, unlike in the simple case, when we are looking at pairwise comparison, it kind of, you know, easy to get our head around that how we can actually compute or understand the consumer preferences.

In this case, there is a systematic way of analysis; how to analyse the data, which is collected from here, and we'll talk about that in the Max-Diff design. But, largely

intuitively let me tell you what happens, what we do is when we create and these sets are created scientifically through the factorial designs and things like that. From the computation or the analysis purposes, we compute first the raw importance rating, and the raw importance rating is every attribute across all the sets, how many times it was chosen as the best attribute and how many times it was chosen as the worst attribute. So, $(\# \text{Best} - \# \text{Worst})$ and divided by the total number of times this particular attribute appeared in all the questions, right? So, that's how we compute the raw importance.

And then, from that raw importance, you can actually compute the standardised importance, which is $(\text{raw importance} + 1)$ divided by 2. And this is the simple sheet where you can see there were 10 attributes, right? and then you can see on the left side these are the sets which basically tell you which attributes were available in that set, and the consumers were asked out of attribute four, seven, eight and nine, which one is the best? and the consumer in this case responded that, the fourth attribute is the most important for him, and the ninth attribute is least important for him. And, in the other second set, the attributes were three, six, eight and 10. And, the consumer again responded that the sixth attribute is the most important for him, when he's thinking about making the choices in the restaurant, and the tenth is the least important. And, using this information, you can compute the best and the worst on the right side I have shown you the same analysis, which basically explained in the minute before. And then, you can get this standardised importance rating and you see they all are between zero and one, and that tells you that, which attribute is most important. So, here you can see the attribute four turns out to have the importance rating of one, and that's the highest rating any attribute can get. So, now you get for this particular customer, attribute four is a very important thing. When he's thinking about this particular... making the choices in this particular category. So, that's what the Max-Diff design is.

Video 4: The kano Method

So, think about another example, where a firm is offering a Software as a Service. Now, through the in-depth interviews and through the managerial knowledge and all this, they've figured out that these are the 15 dimensions which are important for consumers. When they're thinking about buying a Software as a Service.

Now, in the earlier method we just discussed before this. You can ask these 15 questions based on any method we talked about the rating skill, ranking skill, and then they can rank order these things or rate these things, and you will be able to see which are the attributes or which are the benefits consumers care about in this particular product category.

But really when we're doing that, all the methods we have used, including the MaxDiff, what we're doing is, we're taking a very unidimensional prospect of how these attributes are valued by the consumers, right? But really, there might be more dimensions to how consumers value these attributes or the benefits in the product, right? So, what I mean by different dimensions, let's look at this, right.

So, think about there are certain kinds of attributes, which consumers expect to be there in the product, right? For example, when you're buying a car, you expect the cars to have a decent braking system, right? You expect cars to basically have wheels and things like that, right? So, these are what we call the hygiene factor, right? If you don't offer these hygiene factors or the basic attributes, consumers will basically, completely will not consider your product, right?

And these are called the mandatory attributes. And then there are performance attributes, which basically means, if the quality attributes, for example, the camera in the smartphone, right? The higher is the pixel of the camera the consumers value it more, right? These are called the performance attributes, and if it's lower on the pixel, they will actually value it less, right? Then there are the delighters and then there are attributes which consumers do not care about, right? And as I said different people. So, some consumers might care about the camera and the battery life, and some consumers may not care about the camera, right?

Because they don't take pictures from their smartphones, right? So, how can we identify among all the different attributes or the benefits we have identified through the in-depth interviews and through the context can we actually translate those into four different categories, right? And that's where the Kano Method comes, right? So, as I said, the Kano Methods try to identify the set of attributes or the benefits into four different ones, right? One is called the performance attributes, where more of it actually is better. If you offer more of that, the consumers will like it more. In other words, they will value it more and willing to pay you more for those products, which have higher on that particular attribute. Then there are kind of attributes which we must have, right? If you don't have the brake in your car, nobody will be interested in buying your car, right? kind of things, right? So, these are the hygiene factors, right? And then there are kind of attributes which are delighters, right? Where the consumers do not expect to have something like that to be in the product, right? For example, these attributes which we called the delighters, move over the time, right? So, at one point of time, remember when the cars were offering the ABS system or the airbags.

When it was a novelty and if the car is offering these kinds of attributes, people really like that, right? Although they do not expect. But when they found those things in the cars, they liked it, right? These are called the delighters, but now then these delighters become the very acceptable practice and all the cars kind of you know nowadays offer most of the car ABS system and the airbags and things like that. They're not delighters, now the new kind of attributes, the navigation system became the delighter for some time. And it will become kind of, more of a must-have attribute and then as the time grows, these new attributes are introduced in the products and then they become the acceptable practice, right?

But here the question, is there a way we can actually identify which are the attributes, which are the performance attributes, where I should actually spend efforts, money and RND to actually improve the performance of those attributes, which are the attributes I must have in my product and which are the attributes which are delighters, right? And that's what the Kano Method does, right?

Okay, so in big picture snapshot, the Kano Method basically is, you have a questionnaire and this is the question, which basically comes in two forms. One is the positive and the negative and the consumer answer those questions using that data which you collected from the consumers you actually have. You convert them into this kind of, you know, whether this particular attribute is a delighter or a performance and things like that. So, there are three-step process, you design the questionnaire, you collect the data, use the conversion tables or evaluation tables to convert these attributes into whether into different bins. And then we'll talk about how to interpret that or how to basically get insights from that information.

Video 5: The Kano Method: Data Collection and Analysis

So, let's look at the different steps in the Kano method, how the data is collected? And how it is analysed? So, in the Kano method, for every attribute we create two questions. One is called the functional form, where we ask a respondent to rate your satisfaction if the product has this attribute and the counter to that is the dysfunctional form that the rate your satisfaction.

If the product did not have this attribute, and we can usually, we use the five-point scale and I'll show you some examples here. For example, functional question type could be, how would you feel if you had a camera in your cell phone? So, then you can ask them, "I like it, I expect it, I'm neutral, I can live with it, I dislike it" as a five-point scale, and the dysfunctional question type for the same attributes is, how would you feel if you had no camera in your cell phone? Then you say, "I like it, I expect it, I'm neutral, I can live with it, I dislike it." So, those are the five-point scale.

And as you can see, different respondents will pick different ranking for that. Let's look at one other example, right? So, and again, the framing of the question you have a little bit of liberty. But remember, this is just one is that if the product has this attribute, how do you feel about it? And if the product doesn't have this attribute, how would you feel about it? and sometimes, we can ask the question, right? In your current product, which you are consuming, what we are thinking about buying. How satisfied you are with this particular attribute in the product, right?

So, once we collect this information for each and every attribute, then we have this table, right? This table helps us kind of figure out depending on the answer to the question. What kind of attribute is this, right? For example, on the left side, you see the functional question answer, right? and it has a five-point scale. And on the top, it's a dysfunctional question answer, right? And the each and every attribute, depending on where it falls, right? In the functional form, it was rated as four, and in the dysfunctional form, it was rated as one. Then you will see, it will be attractive, right?

And similarly, if in the functional form it was rated as one, I like it, right? If the product has this attribute, and on the dysfunctional question form, it's basically says five, "I do not like the products which do not have this attribute." Then basically you will quote it as one dimensional or the performer, right? And that's how you convert all the attributes into different bins. And then, once you have that, here is another example of the laptop category. A different attribute, right? for example, the attributes related

to the appearance of the laptop. Is it light and mobile, still stylish design, large screen size; or attributes related to the performance computing power, and audio capability, video capability or some kind of functional forms or the service dimensions, right? All these different attributes and within these, basically there are sub-attributes. All can be categorised as whether there are the delighters or performers or mandatory attributes, or consumers are indifferent about some of these things. They do not care about whether you have this attribute or do not have this attribute, and that's how you can quote that. Now, what else can we do?

Now, this gives us the good snapshot of we can look at for each and every consumer. And we can look at how the different consumers vary in terms of what they think is the delighter and attribute, they think are the performance attributes, right? can table look this at this segment level. We can also actually look at answer averages and plot them, right? So, what we can do is, we can actually have some kind of satisfaction and dissatisfaction index and to create the satisfaction index and the dissatisfaction index, we look at the delighted and the performance attributes, right? And divide by the attribute, this percentage means how many percentage of people actually mark this particular attribute as the delighter? And how many percentage of people actually mark it as a performer? And divided by the percentage of all the different categories it belongs to. And that's how you create the satisfaction index and dissatisfaction index.

And using that each and every attribute can, now you see that have these index, and you can plot that on a two-dimensional space, right? Satisfaction index and dissatisfaction index, and this also gives you the pictorial overview of different attributes, whether they are performance, where they're performers, whether they are basic performance, remember is basically the attributes where more effect is very desirable, right? It's a unidimensional attribute.

Delighters are the attributes, consumers do not expect those in the product, but if you offer them, they will really like it. Mandatory attributes, remember the attributes which basically are must have, right. If you don't offer that attribute, then your product will not even be considered among the alternatives the consumers are looking at or the brands they are looking at. And the indifferent attributes, now you identify these are the attributes doesn't matter to them, whether you have it or not have it doesn't matter, right.

So now, that gives you the good sense of where should you focus your energies on, right? what are the things in your product which you would be interested in actually improving? or bring into the bringing in the product, right. Now, you can do that at the as I said at the customer level, or you can also do it at the segment level right. So, for example, in this case, in one of these studies where they try to look at the different hotels, and the hotel have a different attributes like fast check-in, express check-out, location, comfortable bed, Jacuzzi or newspaper, and the exercise rooms, right and the different segment of the consumers values these different attributes of the products differently and you will be able to identify.

And then suppose you are actually developing a product for the business clients. Then you know, what are the things you should be focusing on, right? So, that is what the

Kano Analysis is. Okay, so let's look at how to interpret the results. So, remember, for every attribute we had this functional form and the dysfunctional form. So, what we're going to do is we're going to look at how a particular responded on a five-point scale rated this particular attribute when we asked him the question, which is in the functional form? So, for example, suppose, in the particular attribute on the functional question form was rated as four, right? And the same attributes when we asked them as a dysfunctional question form, it was rated as one what does that mean? that means it should be coded as the reverse. What does the reverse mean?

Reverse is basically nothing is just like the performers, more is better. Reverse means less is better, right? That's how you interpret that particular attribute. Let's look at one more example. So, suppose on the functional form, the particular attribute was rated as two and on the dysfunctional form, it was rated as four. So, in the table, if you look at that, it says consumer is indifferent about this particular attributes. So, that's why you will code that attribute as, indifferent, right? So, that's how you can look at each and every attribute and code it based on this table. So, I'll show you one example of the laptop where 125 respondents were asked to rate different attributes; which attributes are important when they're thinking about buying a laptop? It's an old study, but kind of gives you the idea of how to analyse, and what kind of insights come out of it.

So, here there were multiple attributes and these attributes were clubbed into four main different kinds of attributes. For example, aesthetics or appearance of the laptop, performance, and the functional attributes, and the service attributes of that. So, what you see in this table is, that out of 125 respondents, this particular attribute, which comes under the appearance, is it light and mobile. 19 people rated it as a delight, 54 people rated this as a performance attribute, 27 people rated it as a mandatory, and they expect the laptops to have this particular attribute. 22 people were indifferent about the debate of the attribute because they probably do not care about taking the laptop from one place or logging it over from one place to another. And one person, actually, based on his rating, decide it's actually he is reverse, right?

In fact, he wants the heavier laptop, right? And for the two respondents, by looking at their answer, is questionable, right? So, we are not sure about what they think about this particular attributes. So, you can see now each an attribute has been classified into these four or five different bins, and then that gives you the sense of, what are the important attributes in terms of when you're thinking about launching a maybe a new product in the market, new laptop in the market, right? What else can we do? And now again, before we move to that, if you look at whichever this particular attribute by most people, right?

So, you want to look at this is the individual level attribute importance, but on an average, this particular attribute wherever it falls the most, right? For example, the stylish design. Most of the people are delighted by having a very stylish design on the laptops. And I remember this is a kind of old questionnaire. So, at that time, laptops were very utilitarian. But if some firm can actually offer a very stylish design on the laptop, people will be delighted. And 57 people actually think, coded this attribute as

a delighter, and that's how, on an average in the Kano category, we will put this particular attribute as a delighter.

Now, as I say, you can do a little bit more. Actually, you can pictorially look at this information and you can also do this analysis based on the segments. So, let's see how we do that. So, to transform these delighters, performers and the reverse attributes. We can actually create some kind of index, right? We can create two indexes: satisfaction index and the dissatisfaction index. What is the satisfaction index? Satisfaction index basically measure the percentage of people classified the particular attribute as a delighter, and the percentage of people classified this as a performance divided by the percentage of people classified as delighted, performance, mandatory and indifferent. Right? And that's how you create the satisfaction index.

So, for each and every attribute, you can have the satisfaction index, and you can have the dissatisfaction index. And then based on these coordinates, you can plot it on the and you can look at all these different attributes visually, right? And that also gives you the same information, but now you know that which are the attributes, which are the performance, right? Performance remember, the more of this attribute, the more value consumers put. For example, the camera quality could be the performance attribute, if you have more megapixel consumers actually like that, right?

The delighters are the attributes remember, which consumers do not expect in this category. But if you can introduce that particular attribute, they'll be very delighted, right? They will be positively disposed towards the brands which are actually offering these kinds of delighters. Mandatory attributes are the attributes which must have, right? So, for example, in the laptop category, certain attributes everyone expects that it basically does all the basic stuff which is expected out of the laptop. So, those are the mandatory, and there are attributes which consumers might be indifferent about in this particular product category.

You will be able to identify all these different attributes and based on a judgement call and in managerial and the firm's ability to introduce some of these new attributes or improve some of the attributes. It gives the good sense of where to focus your efforts and energy in terms of when you're launching or thinking about the new products, right? This you can do at the individual customer level, but you can also do it at the segment level, right? So, for example, in this example, one of the hotel chains was interested in finding out: what do people care about when they're thinking about picking the hotel? Right?

So, business clients need could be very different from the person who is going on a vacation and booking a hotel, right? And when you look at that, that what people might care about when they're thinking about booking a hotel, the price, fast check-in, express check-out, location, Jacuzzi or whether you offer the cable and HBO and you can see the business clients actually rate, for example, the price. Price for them is if you can offer the lower price is very good. That's a performance attributes, but for the vacationer or its must, right? They really want the low price because they are paying probably from their own pocket, and they don't want to spend too much money on that, right?

In terms of fast check-in, right? So, fast check-in is good for both business clients and the vacationer, and that's how you can look at each and every attribute. Whether a swimming pool is offered, is it? For the business client, having a swimming pool is a delighter that okay, anyway, probably he won't be able to spend time in the swimming pool, maybe sometimes. But for the vacationers that's a must have, right? If you don't have a swimming pool, then probably he will not enjoy his vacation that much, right? And that's how you can figure out that, which are the attributes which different consumer segments care about, vis-à-vis is another customer segment.

Video 6: Latent Needs-Factor Analysis

So far, what we have looked at is, how to think from the customer's perspective, what attributes are important, right? So, we looked at different methods to rank order the attributes. We looked at the Kano Method, which basically helps you identify, which are the attributes which are delighters, which are the attributes which are performance based, and so on and so forth.

Now, these were all in some sense, unidimensional way of looking one attribute at a time, right? So, now in this section, what we will do is, we'll try to look at another technique which basically tries to identify, are these multiple attributes alluding to some fundamental need, right? Are they catering to the fundamental need? And that's where the factor analysis comes into picture.

So, think of an example. A toothpaste manufacturer wants to explore what consumers actually care about when they are buying the toothpaste, right? What do they really feel about the different attributes of the toothpaste, right? So, think they have collected the information on a different attribute and their attributes could be, how important is the anti-cavity property of a toothpaste? how important is the whitening property of the toothpaste? how important is the strengthening of gum property of the toothpaste, right? how important is that your toothpaste actually freshens your breath? Or how important is that it actually helps you prevent the decay of the tooth, right? So, all these different benefit dimensions are there. Now, the question is, are they independent benefit dimensions or they all actually can be clubbed into the smaller set of latent dimensions, and these are the artefact of those latent dimension, right?

So, we have seen that six different attributes, and suppose we have collected this information from multiple respondents, say 30 respondents. What we really are interested in identifying the underlying themes, right? Are there some underlying themes which these six attributes or the benefit dimensions are alluding to? So, how do we do that? And that's where the factor analysis comes into picture, right? So, here is the raw data, which we think about we asked the respondent on each and every benefit dimension.

We asked them to rate how important that particular dimension is when they're thinking about buying a toothpaste, right? So, for example, respondent 1 thinks the anti-cavity property of the toothpaste is very important, right? And he thinks the tooth

decay property is less important. So, if you eyeball the data across multiple response, do you see some pattern here?

Can you identify that may be the anti-cavity property is related heavily to the gums strengthening property? And are they alluding to something very fundamental which we want to identify, right? Okay, so what we will do is, we will feed in this rawdata into the factor analysis app and see what emerges out of it.

Video 7: Factor Analysis App

Let me walk you through, the Factor Analysis App. The Factor Analysis App takes the input, this survey you have conducted and then gives you the output. So, what we're going to do is, we're going to use the toothpaste example. So, where the data, which you can download from LMS, looks like this. There were 30 respondents and each respondent rated each and every attribute of the product. How much they like this attribute in their product? for example, respondent one wants to have the anti-cavity property in the toothpaste, and he rated it at seven. And the responding two does not care about the anti-cavity property. So, that's why he rated it as one, right? So, once you have collected the data from the respondents, we wanted to understand the latent structure in this data. Are there kind of latent constructs which are related to these preferences for different attributes? So, we're going to upload the data, going to select wherever you have downloaded the data. Just upload this data and remember, the data should be in the CSV format. And once you have uploaded the data, automatically it will select the variables and then do some calculation. The first thing you want to do is, you want to look at the 'data summary' tab, just to make sure that the data is correctly uploaded.

So, here you can select the number of observations you want to see, and you see that there are: first column basically corresponds to the respondent ID's, and the next column is anti-cavity. How each and every respondent rated the anti-cavity property, or the teeth whitening property, or gum strengthening property? right. how important is that in terms of when they are buying the product? so, the data seems like is correctly uploaded.

Next, you can see that summary statistics of the data. So, you will see for each and every column. What is the minimum value, respondent gave? What is the maximum value? Remember in this, this was the survey data. So, everyone was supposed to rate all these properties on a 1 - 7 scale. So, what's the minimum-maximum? What is the median and mean? And some more information, right? So, then you go to the factor analysis app, and here the first thing you will see is the 'correlation Table.' The way to understand this correlation table is that these 'dots', the size of the 'dot', basically tells you how these things are correlated, right?

So, of course, anti-cavity and anti-cavity is the same variable, so they basically are highly correlated. It's obvious. But the anti-cavity is highly correlated with the gum strengthening properties because if you look at the size of the 'dot', it is very big and

it's darker, right? So, here is the scale: one is high correlation, minus one is high negative correlation. So, if you see the 'red dot', that means the anti-Cavity property and the tooth decay property are inversely correlated. What does that mean? That means the people who prefer to have the anti-cavity property in their toothpaste are less likely to have the tooth decaying property.

So, this is why it is negatively correlated. And this seems kind of, you know, very unimputive. The people who care about the anti-cavity property do not care about the tooth decay property. This happening in this particular case because the way the question was structured, right? So, for example, for the anti-cavity property, we asked, "how important is the anti-cavity property when you're buying the toothpaste?" So, basically, it was the reverse of the question, for example, how much you agree that the toothpaste should not have the tooth decay property? Right.

So, but whatever the data is basically, the correlation table will show you. Now the app automatically does the Factor Analysis for you. So, kind of, you know, try to look at the correlation structure and identify and group them into different underlying latent factors. And the number of factors will be automatically selected for you, whichever the algorithm things are the optimal. But you can always change the number of factors if these factors which are coming out do not make any sense. So, I'll come to the factor loading in a second, and I'll talk about these things. But let's go to the 'factor loading' tab itself. right.

So, the 'factor loading' tab basically, so each and every variable is kind of you know, is correlated to the which factor, right? So anti-cavity is highly correlated with the factor one, but less with the factor two. And that's how you see that these three things have been clubbed together, right? And these three things are clubbed together. So, tooth decay property, anti-cavity property and gum strengthening property are highly correlated vs the fresh breath, teeth whitening property and the filling the gaps property are highly correlated. So, that's how you can kind of receive that there is some structure which is emerging.

Now, of course, you can play with the 'line thickness'. This is nothing, it's just more like, sometimes people want to see, you know, how these groups are correlated with each other. And the correlation table, we already talked about is that, the number tells you the strength, right? So, for example, anti-cavity property and the gum strengthening property are, the correlation is 0.873. The negative sign basically tells you that they are inversely correlated, they move in the opposite directions. For example, when people rate the teeth whitening property high, then they kind of rate the gum strengthening property as less important. So, and that's the same factor loading what you have seen here, right? Now, what we will do is, we will look at the under the thing, which is the factor loading Map, which is the same information.

The factor loading, you can visualise it differently, right? So, how these original variables, which we shown as a vector, right? So, the teeth whitening property and the fresh breath property, they're kind of, you know, moving in the same direction, and they are highly correlated with the vertical axis. And if you look at the horizontal axis, the anti-cavity property and the gum strengthening property and the tooth decay property, so these are highly, positively correlated and negatively correlated.

Now looking at this. One can kind of try to get the sense of what these latent factors probably will be alluded to, right? So, for example, one can say, the factor 1 which is highly related to the fresh breath and the teeth whitening, maybe as the cosmetic properties of the toothpaste, right?

And the anti-cavity and the gum strengthening and the tooth decay properties more like medicine or properties of the toothpaste, right? So that's how you kind of get the understanding of what are the latent constructs, which consumers care about in the product category. Again, these cutoffs are mostly to kind of, you know, sometimes when there are too many factors, they want to, we want to kind of mute some of them to see if we can make better sense of the factors so you can play around with these factors. So, now we understood, how the original variables are related to the factor by looking at this graph. There is another graph where basically each and every observation. Right.

So, the original observation, if you remember in the data, were basically had these six dimensions, if you want to call it columns, right? And every respondent basically were rating, their preferences on these six dimensions, right? Now, what we did is through the Factor Analysis. We were able to club some of these dimensions and kind of, you know, now we can say, okay, the respondent one on these new dimensions which we have discovered, which we said the cosmetic property and the medicinal property, how do they stack up on these dimensions? So, in this plot, the same two factors which we have seen in the factor loading map, the same on two factors we plot each and every respondent. And that gives you the sense of, how these different respondents are kind of, are grouped together, right?

So, here you can see there are a bunch of respondents who care about high factor 1 property, but care less about the factor 2. You know, when the factor two, which was the vertical, was more of a Cosmetic dimension, and this was more of a medicine and property, right? So, this also gives you a sense of how different respondents, what do they care about, and things like that, right? One more thing before I move on is the Factor Analysis tab, you will see that there is some advanced analysis.

So first of all, let's look at this particular information. What this information is telling you is that, how the original variables are related to the factors. And of course, you can kind of, you know, view that change these cutoffs to kind of, you know, to populate this thing. But what is more important is the proportion of variance, right? So, what this is telling you is that if we measure each and every respondent's importance rating on those six original dimension vs if you measure it on only factor 1, then how much of the information is captured? So, factor 1 basically captures the 42% of the information and factor 2 captures the 32% of the information.

So, cumulatively, instead of measuring things on a six-dimension, the original important ratings on six dimensions. If we only measure it somehow on the two-dimensions, right? I will be able to get 74% of the information, right? So instead of asking six questions, if I ask only two questions, then pretty much I get this 74% of the information which we would have captured in and that's where one can decide. Okay, maybe the 74 is not enough. I want to include more factors, right?

So, you can include more factors, and you say, the third factor is only able to capture 4% of the information, and then you are able to capture the 80% of the information. But as I said, mostly what happens is and you might see some errors happens. But don't worry about it because the algorithm actually is designed for these optimal number of factors which it picks. Now, the uniqueness table is also related to the kind of, you know, information captured by these factors, right?

So, if I settle for the two-factor solution, then the original variable, right? This uniqueness is telling how much of the information is not captured in the factor 1 and the factor 2. So, you can see that teeth whitening property, right? So, 44% of the information is very unique to this particular dimension, which is not related to factor 1 and factor 2. So, that's why it's called the uniqueness, right? So, breath freshening property and the teeth whitening property are less explained. But other things, for example, tooth decay property and particularly anti-cavity property, the uniqueness is 0.06. That means 94% right, 94% of the information is captured in two-factor solution. Okay, so this is how we look at the uniqueness table. And then these are the graphs basically to identify the optimal number of factors.

So, it has different criteria. And as I said, the algorithm automatically picks the optimal number of factors for you. But if you want to look at, you can see, it's basically looking at this 'black line' and the intersection of 'black' and 'green' line, whatever this point is, the number of factors which are just left way is basically what the optimal number of factors.

So, I'm not going to go into the details of how and why this is true, because that requires a lot of statistical kind of analysis and things like that. But for you, for all practical purposes, you can look at these values and decide what the optimal number of factors, should be, or you can look at the cumulative variance. Right. So, if you have, say 100 variables, then maybe you probably need 20 factors to capture at least 80 - 90% of that information.

Video 8: Intuitive Understanding of Factor Analysis

In the earlier video you have seen how to upload the data into the app and then what kind of different analysis come out of it? So, what you have seen is that nicely all the six original variables have been regrouped into two groups, right? We can actually choose two groups or three groups. This is something which the researchers have to decide. But largely this group is happening based on the correlation between these two variables, original variables.

So, in other words, what Factor Analysis is doing is taking the original variables and projecting it. So, for example, the original data set has six dimensions, and the dimensions here means that the different benefit or the attributes of the product and it's kind of trying to project it into two-dimensional spaces, right? And that's what in the Factor Analysis you will see two kinds of output coming out of it, factor scores and factor loading.

But intuitively, a factor is a new variable constructed from the group of the correlated variables in the original data, right? So, we're talking about grouping the variables in

terms of the correlation, what really the correlation means? So, correlation here means, here to understand, intuitive understanding of what the correlation means, what I'm doing is I'm plotting two variables here. The two original variable; the anti-cavity property of the toothpaste and the gums strengthening property of the toothpaste and the tooth decay property of the toothpaste.

So, on the horizontal axis you see the number of respondents and on the vertical axis you see what their ratings were on these attributes. So, you see the 'red line' and the 'dotted Blue line'. They're tracking each other very, very similarly, right? Whenever the respondent is rating the anti-cavity property high, is also rating the gums strengthening property very high. And whenever they're rating the anti-cavity property the respondents who rated the anti-cavity property is less important for them in the toothpaste category. They're also saying that the gums strengthening property is also less important, right?

So, if you see that therefore, these two graphs are following each other very tightly. That means they're highly correlated, right? And if you compare that to the 'black graph', which is the tooth decay property, then you will see that this particular 'black curve' is not following the 'red one' that well, right? That means the tooth decay property is not correlated with the anti-cavity property. And using this kind of structure, the algorithm basically tries to club and says, okay, anti-cavity property and the gums strengthening property are very correlated. So, they probably are alluding to the similar latent needs. And the Tooth decay property is actually alluding to something a different kind of need, right?

So, again in the app, you have also seen that we have presented to you the correlation tables, right? You can graphically look at the correlations on the left side. As I show you that the 'blue ones' basically, if you look at the 'dot', the size of the 'dot' is telling you the strength of the correlation. And if it's 'blue', that means, it's positively correlated. And if the 'dot' is 'red', that means it's negatively correlated. And you can also look at the numerical values of how correlated they're. For example, if you look at the anti-cavity property and the teeth-whitening property, the number there is -0.053 and 'minus' is basically signifying that they are inversely correlated, and the 0.53, the number is telling you the strength of that correlation.

Now, this is the basic underlying kind of mechanism by which we try to group together and try to make sense of what are they alluding to, right? So, that's how what you have seen, that three of the variables have been grouped together and we will look at what really it means why these three groups are together. I've talked about. But then the question is, what does it mean that these three groups are alluding to some latent dimension? What probably that latent dimension is, right? And for that, we're going to look at the factors scores and factor loading tabs.

Video 9: Factor App (Interpretation of Results)

So now, you have seen the intuitive understanding of what factor analysis is doing. Basically, trying to identify the correlated variables and group them into smaller groups. Right? And the outcome of that analysis is, you get two things, right? One is

called the factor scores and the other one is called the factor loadings. Let's try to understand how to interpret these things, right? So, what is factor loading?

Factor loading, basically, is telling you how the original variables are related to the latent factors. And remember, how do we come up with these factors? These factors, we decide how many factors we want to actually, in other words, how many smaller groups we want to group the original variables into. So, in this case, and we'll talk about how to identify the number of latent factors, but the app automatically selects for you the optimal number of factors. Right.

In this case, the app has selected two factors for you, and if you look at the factor loading, you will be able to see which are the original variables associated with the factor one and which are the original variables associated with the factor two. So here you can see in the output, that the anti-cavity gum strengthening property and the tooth decay property are all, we call loading on the factor one. So, they're highly correlated with the factor one. And that gives you the sense of that what potentially this dimension, the factor one dimension would be, right. And similarly, you can see that the teeth whitening property, the fresh breath and the toothpaste should be filling the gaps in the tooth, is loading to a factor two, right? So, that should give you some idea about what probably these factors are, right.

Just think of a second, and then maybe the first factor is alluding to some kind of the health property of the toothpaste. And the second factor, maybe, is talking about the aesthetic or the cosmetic property of the toothpaste. Now, the other thing you are interested in that because you had originally six variables, and now you're trying to understand these six variables only through two newly constructed variables, which we're calling the factor one factor two, and the factor one, and intuitively, you can see that it's kind of alluding to the health benefits of the toothpaste. And the factor two, is talking about the cosmetic benefits, these two dimensions.

How much of the original data is getting, you can explain by only looking at these two factors? Instead of looking at six original benefits, if I only look at these two benefits, how much of the information I am able to capture. And that comes from the cumulative variance. So, if you look at the first factor is able to get the 42% of the information and if we add a second factor that explains the 32% of the information in the data. So, cumulatively, we are able to explain 74% of the information in the data, right. And that also helps you kind of identify should you go for a two-factor solution or three factor solution or four factor solution. Right.

By looking at how much variance in the data is explained by the factors. Now, you they're nicely actually pictorially, look at the factor loadings. Here, in this picture, which basically shows the factor loadings, you can see that the arrows here are representing the original dimension of the data. Right. So original dimension of the data and the vertical axis in the horizontal axis are the two factors. And you can see that some of the original variables are more aligned to the vertical dimensions, and some of the original or the three of the original variables are aligned to the horizontal dimension of the data.

Okay, so, in fact, if you look at the factor app, the original grouping of the variables, you will see exactly those three variables which were aligned to the vertical

dimensions are grouped into one factor and the other three variables, two of them, actually, were directing towards the right side and one was directing towards the left side, but they were all aligned on the horizontal axis. And that is the red group in the original grouping and the lines between those groups, right, so that either it could be red or it could be green. The green line is telling you that these are positively correlated, and the red ones are basically the lines, if they are red is telling you that this is negatively correlated.

So, that's how you kind of read those outputs in the data. Now, the other thing, you want to look at is the factors scores, right. What is factor score? Intuitively, again, factor scores are, remember, in the original dimension, each and every respondent is scored the six variables on a 1 to 7 scale. What factor scores are basically is the same thing if we would have asked the respondent to actually rate these things on two factor scores what those ratings will be. So, you are looking at their original ratings, now we can transform and look at their, the new ratings on the factor scores, right. For each and every respondent, they will, you will see in the factor scores what the rating is.

And these ratings may not look like on 1 to 7 because these are all standardised, right? And what these ratings tell you? These ratings again, you can plot all these respondents on a two-dimensional factor score plot, and then you can see that some of the respondents actually are grouped together, the other kind of respondents are grouping together, right? So, if we are able to interpret the original the dimensions of the factor analysis, for example, we said one of the dimensions is the health benefit, another dimension is the cosmetic benefit, the customers who care more about the health and also care more about the cosmetic. There are consumers who basically care a lot about the health and less about the cosmetic property of the toothpaste.

How many of them are there and things like that, right? And using that information you can see. And if you look at these consumer's demographics who belong to the particular quadrant, you can identify that these are the consumers may be in your product because your product is good at, say, health benefits. Then you can say these are my potential target consumers who would be interested in my product. So, that's how you kind of make the interpretation of the entire factor analysis.

Video 10: Factor App (Other Results of Interest and Summary)

So, I hope by now you have the good understanding of what the factor analysis is? And then how to actually interpret the results coming out of the factor analysis and how it can help you understand some of the latent needs of the consumer. Right. But before we close, there are a few more things I want to talk about in the factor analysis app. One is that how do you decide the number of factors or the number of latent constructs, which there may be, in our example, we looked at the small example where we had only six attributes. What if there were 200 attributes, right? Will the two-factor solution be enough to summarise all these things? Or maybe, or maybe not? To look at that, that's where we look at the cumulative variance. right?

So, in fact, if we originally, we had said 100 attributes or benefits, then potentially you can create a factor solution, which has 100 factors, right? But that would probably

defeat the purpose because we really wanted to, in some sense, wanted to reduce the dimensionality of the data, or wanted to understand what are the latent constructs of the benefits consumers are seeking in this particular category or in this particular product, right? So, to decide the number of optimal number of factors is good enough for all the practical purpose, there we look at the scree plot. And in the scree plot, what you will see is that there are different ways actually, registrations and researchers talk about, what are the optimal number of factors.

But one easy way is to look at this where this green line and the black line is intersecting. And then you basically look at that intersection. And based on that, whatever is the number of factors before that intersection is kind of the optimal number of factors. So, this is one very easy way to think about.

Other way people think about it, is look at the cumulative variance and then say at least my factor solution should be able to explain 80% of the variance in the data, right? That's another popular way to decide a number of factors. Okay, now, as I said, because we started with the six original variables, right, the six dimensions or six benefits, and we're trying to compress it in some sense into two dimensions, right? So clearly, part of it will not be able to explain right, and that's what we call it, kind of think about that as a noise or something, right, which is not that important. Primarily, all the information in these six variables are captured through two factors, right. Now, so there is something else you can look at. There's something called the uniqueness table.

In the uniqueness table, each and every original variable, right, after doing the factor analysis, when you settle down that the two-factor solution is good, then it tells you how much of the information in that original variable is not being explained by the two-factor solution, right? So, for example, if you look at the anti-cavity, 94% of the information is already captured in two factor solutions. But the 6% of information is kind of, is still lying, and it's not in the two-factor solution. But if you look at the teeth whitening property, that you will see that 56% of the information is captured in the two-factor solution. But the 44% of the information is still, cannot be captured in the two-factor solution. And by looking at the uniqueness table, sometimes you may identify that there are original variables, where the 90% of the information cannot be captured by the factor solution you created. That means, that particular variable is unique in its own sense, right, that should be considered as a factor, which is not correlated with other variables in the data. And that tells you something, completely a different story more than what the factors are able to explain, right? So, in summary, factor analysis is the method which helps you understand the huge amount of data, huge number of dimensions and be able to actually compress it and combine them into smaller set of variables.

Let me give you another example. For example, suppose you are interested in students' evaluation, right? You want to know what students; how good they are on different dimensions. So, you look at their scores on the physics. You look at their scores on the mathematics. You look at their scores, exam scores, english, maybe history, and those are things. But if you really think about it, at the end, all these scores in the mathematics, physics, english or history and the other thing and social sciences, probably are coming from some basic construct of the IQ, right? So, the IQ could be, you can think about the dimensions of the IQ could be that the analytical

skills, right? IQ dimension, because you could be like you can think about your creativity. Other dimension could be that how good you are at memorising things. So, you will see that the people who have a high analytical skill probably will be scoring high in the maths and the physics and things like that, right?

People who are good at memorising things, maybe scoring well in the history and things like that. Your ability to write. Suppose that's the underlying construct, right? You also need not only the good analytical skills, but to answer maybe physics and maths question, you also need some level of ability to write well, right. So, that's what we're trying to do. Instead of looking at the raw score, raw exam scores in physics, chemistry, maths, english and history and all those things, we can actually look at holistically, that the student at the core of it, this is the student who is good at maybe analytical skills, these are the students who are good at creativity, these are the students who are good at writing and so on and so forth. So, that's the basically the idea of the factor analysis.

Factor analysis can help you identify those latent constructs. So, in nutshell, it untangles the web of intercorrelated variables into small set of hopefully, cleaner factors, reduce the size of the data. So, instead of working with the huge amount of data and too many numbers of factors and the benefits, you can reduce it to lower dimensions. For example, in our case, we were able to reduce the six dimensions of the toothpaste into two fundamental dimensions, right. Then, it also gives you the sense of how to interpret these new dimensions, right, through the factor of loadings, right. And then also gives me the factor scores that how these different respondents, stuck on the new dimension.

Two factor dimensions, we can plot them into the new variables and see how they are basically, how they can be grouped and segmented, right. And then we can look at their demographics and see, okay these are the kind of people, maybe the people who are living in North, or people who have a high income, they mostly care about the cosmetic property of the toothpaste. And the most important is, I'm giving you the very simple, menu-driven app interface, which you can use to do this analysis. Otherwise, I mean, without going into nitty-gritty of the statistics and how to do all these things. You have a very nice way, you can, as long as you have the data in the right format, you will be able to use this app to reduce it and understand, reduce it to the lower dimension and interpret the results.

Video 11: Module Summary

So, in this module, we look at a different approaches' forms use to understand consumer preferences. And, of course, you can start with talking to your customer, and that should be the first talk. You should always go and talk to your customers and try to understand what do they care about. And once you have done that, then you might have the list of all the different benefits or attributes, these consumers care about or all different kinds of problems, which they are facing, which they want the solution for and after that, you can do your more systematic deep dive into those benefits, or the attributes consumers care about through the explicit response function.

And we talked about multiple ways from collect that information largely the idea, there is to kind of in a rank order, all different kinds of attributes or the benefits consumers care about when buying in the category, right? And then we also looked at that instead of just rank ordering the different and future benefits for the consumers, we can actually look at the more nuance, we can look ok, these are the attributes, which, of course, are performers, so I should try to improve on those attributes compared to my maybe competitive offerings and my consumers will probably like my product better than the competitive products.

But also, what are the attributes which, if I can offer in my products, will delight my consumers, right? So, you can identify the attributes which are delighters, the attributes they don't care about. So, don't spend your energy and efforts in trying to improve all the attributes which consumers do not care about. You can identify the attributes which basically must have, right?

So, make sure that these are the attributes definitely present in your product offerings, otherwise, the consumers will not consider, those products, either you can use, to understand all this you can use the Kano Analysis. And we also look at the factor analysis which helps you understand if you have too many benefits and too many attributes what really are the underlying construct or the customer needs, which are driving these kinds of benefits, right? And maybe that also gives you the good sense of okay, at least at the field level, right? What the consumers care about in the product and that also helps you design your products and maybe segment the market better.

So, with that, I hope you are able to understand all the different methods of how, in the real-world organisations actually try to make sense of or understand the consumer preferences.

Video 12: Max-Diff Analysis

So, let me walk you through the MaxDiff Analysis app. So, before this, you have to use the MaxDiff design app to design the survey and then, ask the respondents on different questions, which option is most preferred and which option is least preferred. So, once you have collected the data, then you can use this app to analyse the data. So here, I have the sample file for you, so you can download this sample file. This is the data which I have generated to show you how the app works.

Once you download the data, then you're going to click on this button and point this to the place where you have downloaded the data. So, this is the filled out MaxDiff survey data, I'm going to point it to that place and remember to save this file in the csv format. This app actually takes the csv format, not the excel format. So, once you have downloaded the data, then you can see what your survey design was, right? So, there were nine questions and every question had five options, and the responses was supposed to kind of pick which is the most preferred and the least preferred option for each question. right?

There are 50 respondents in this survey, and for each and every question, respondent basically choose which is the most and the least preferred option. So, for example, for question one, respondent one, choose the first as a least preferred option, and the second as the most preferred option. So, this is how the original survey was, so you can look at okay, respondent one in question one, the least preferred option was apple, and the most preferred option was TSMC. right?

For question two, least preferred option was Microsoft, and the most preferred option was Google, right? And that's how the data is organised for this app so, once you have uploaded the data and we have looked at all the data is correctly uploaded, then you can click on these buttons. And once you click on this button, the analysis will happen on the background. You don't have to do anything. So then, you can see the normalised scores as we discussed in the class and the rank order of these different brands. In this case, what were the average preference for these brands.

And below that you can also look at the respondent level normalised scores. And remember, the normalised scores are kind of correlated with the rank. So, the highest normalised score is one and the lowest normalised score is zero and the normalised scores is how we calculate the rank. So here, you can get the normalised scores for each and every respondent. As per respondent one, how the preferences for this and different brands look like, right? So, this is how this app can be used to analyse the maximum data.

Now, of course, there are a few more tabs here, which are little bit advanced by just kind of for the completeness' sake, I'll walk you through this. Suppose a lot of times so based on your kind of these normalised scores which are a proxy for how these brands are preferred by the respondents. We can do the segmentation analysis and then, you can choose the number of segments and here you use this graph to kind of figure out what are the optimal number of segments and then, the app will automatically cluster all these respondents into different segment. For example, there are three segments we chose and what are the preference orders for these segments, right? Remember, in this tab, you got the preference or their rank ordering for the entire sample.

Now, we have segmented or clustered all the respondents into three different clusters, and you can choose a more number of clusters, right? And then, based on that, you can see that at the segment level how the preferences change, right? You can also kind of correlate these segments if you have the demographics data and again here, you have the sample demographics data which you can download and you have to then, whatever. I mean, for your case, you will have if you'd would have collected the demographic data from each and every respondent, you can use that. And once you upload that data, then you can also look at the segment level, right? How the demographics look differ across segments, right?

So you can pick, say, for example, segment one what the demographics look like? For segment two, how the demographics look like and so on and so forth. Make sure these are the two advanced tabs, it is not necessarily for MaxDiff analysis. But if you want to do further analysis, you can use these two tabs to do the analysis. But for our purposes, we wanted to kind of use the MaxDiff to rank order these brands or in other case, this could be the attributes of the product, right?

So, there are, for example, in the smartphone case, there are attributes like RAM, screen size, operating system and things like that. And you wanted to kind of understand, which are the most kind of important attributes in the when consumer they're thinking about buying these products and you can use the MaxDiff analysis to understand that.

So, I hope this is clear because the app is pretty straightforward. Basically, whatever data you have collected from your survey, you just have to upload that data here and the app does the analysis. And these are the only two tabs you are interested in at this point of time.

Video 13: Max-Diff Survey Design

So, let me walk you through the Max-Diff design app. The app is pretty straightforward. What you have to feed into the app is, for example, if you are interested in rank ordering the brands, right. So, you just enter these alternatives with as a comma, delimited, for example, Apple, Microsoft, Google. So, once you input these alternatives here, it will show up on this panel that what are the alternatives you have selected.

And then pretty much in the background the app automatically does the job for you. The only thing you have to remember here is that there are these two alternatives which you can use to set the design, right? Now, how to think about these, these alternatives how to set? So, this basically tells you the number of options per questions. So, if here the default is four, but I can sometimes, when they have too many alternatives, I can make it five alternatives, right? So, for every respondent, basically, we'll look at this as one question, and they have to pick which option is the most preferred option, and which option is the least preferred option. And the second one, basically is the number of questions, right?

So, I can increase more questions or less questions. So, the way to think about how to set up these parameter values is, is that you don't want to ask too many questions. If we can ask fewer questions and get to the same information it's always preferred, right? Why unnecessarily ask respondents more questions when they are not? So, the way to think about it, by using these two parameters value, you want to make sure that every alternative is appearing at least three times.

So, here you see, some of the alternatives are appearing four times, some of them are appearing three times. So, this is good. But I can actually reduce it to a number of options, which, for each question, and then you will see that some of the alternatives are not appearing enough number of times, and I can control it by increasing the number of questions. So, using these two alternatives, you want to kind of design your survey.

The only thing you have to remember is that at least each alternative should appear three times. And here I'm showing you the filled out several survey for the reference, right? That from one respondent we ask which is the most preferred in the least preferred option and for each and every question, he basically said: for question one,

when there was these four, five options given to them. He preferred the least preferred option was Apple, and the most preferred option was, TSMC, right?

For questions two, the least preferred option was Microsoft, and the most preferred option was Google, right? So, that's how you're going to collect the information separately, and then fill it out in your excel sheet or the CSV file. And once you have the information from the respondents, then you can use the Max-Diff analysis app, to do the analysis.