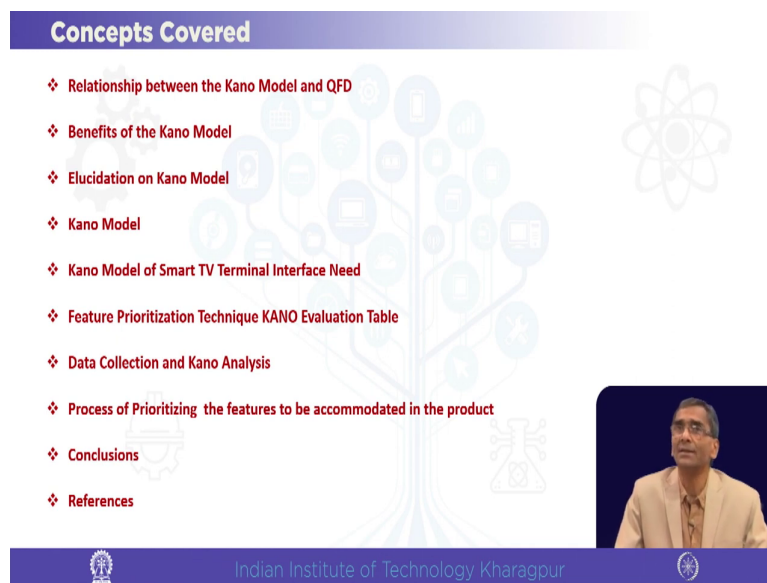**Product Engineering and Design Thinking**
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Module - 04
Concept Generation and Testing
Lecture - 16
Kano Model and Analysis

Welcome back to the session on Product Engineering and Design Thinking. Now, we are studying module 4 which is the Concept Generation and Testing and today we will be discussing on Kano Model and Analysis which is the lecture title.

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We would first talk about the concepts covered here in brief, that we had discussed we had discussed on QFD earlier and we will take the Q from that and trans see the relationship with

between QFD and Kano. And, then we will move on to the Kano Kano model, its elucidation and description and then examples.

Finally, we will talk about we will check how the analysis is done in Kano model for feature selection in product design. And, then we will set the prioritization process or technique, that will tell us how the features will be accommodate to be accommodated in the feature and how to prioritize them to be accommodate in the product. So, we will go into the topic.
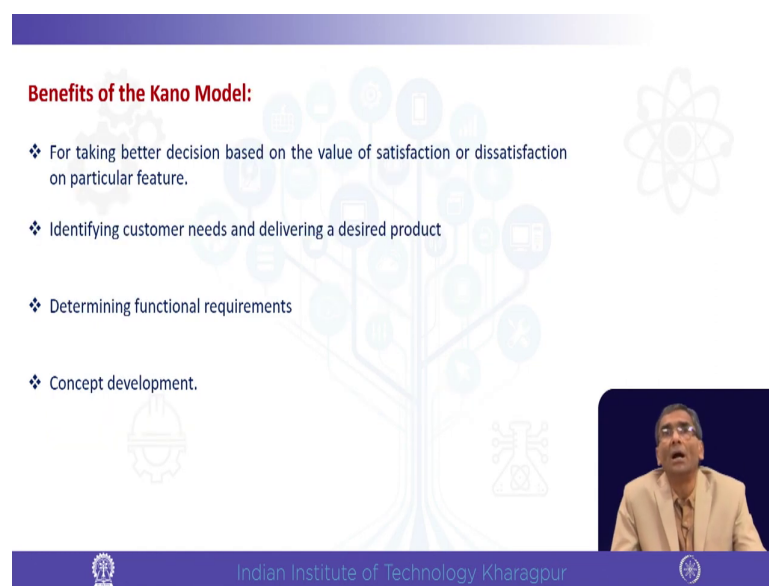
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First, as I said that we will just check how these QFD and Kano are connected. It was developed by the Kano model developed by Noriaki Kano. And, according to his name this Kano model is known today which was developed in 1978. It aids in identification of delighting or exciting requirements; functionalities or features usually associated with innovations.

The integration of Kano model in the QFD provides necessary attention on such innovation requirements. Kano model can be integrate with QFD at each of its four stages say the customer requirements, part requirements, or parts characteristics, process parameters and production requirements respectively. So, in each of this it can be connected. So, this is a brief touch upon on the between these two, but here mainly we will discuss on Kano model itself.

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What are the benefits it? For taking better decision on the value of satisfaction or dissatisfaction on particular feature. What does it mean? If a feature is in a product, it may give satisfaction, it may give dissatisfaction. I mean without going to a complex technical example which we will come to later; I would just give one example which would be nice for you to hear.

There are hotel room beds which are straight, but for fanciful design if a hotel room and actually that was a hotel room bed had it is the it has 4 legs. So, one of them actually extended outside with a design which is a beautiful design on wood work. But the problem is since people are not accustomed with that design; every now and then people will hit their foot on that extended portion which actually carries a beautiful design.

So, that feature is actually cause ultimately of this satisfaction. So, there are examples like this. Identifying customer needs and delivering a desired product is facilitated through Kano model. We will see how. Determining functional requirements and it is therefore ultimately culminates into the purpose for concept development. These are the things that we get from Kano model. How you do that?

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We will come to this. But before we delve into this, we would like to understand there are 4, 5 kinds of requirements or 5 types of that attributes that the Kano model illustrates linkage between customer satisfaction and the realization of customer requirements in terms of functionalities and features or attributes based on 5 characteristics of such requirements.

What are they? One is the threshold attributes, threshold that is, that is the that is the level or limit that is must have. Below which people would consider it is a must have has been removed or not supplied. So, must have or the basic it is also called basic requirement. These attributes are taken for granted when present, but result in dissatisfaction when absent.

When it is present, nobody would care because it is so granted like a mobile phone. If you say ok today there is an camera in a mobile phone, it is granted; in a smartphone there will be a camera. But earlier that was not the case. Earlier it was a delighter, exciter; that phone has an camera also, but now it is a given in a smartphone. Now, so a so, there they are viewed as a basic. Example, say if I say the inside light in the car will be on when the door opens.

So, it is a it is a given, I mean if it is if it is not there people will notice it, if it is there people will simply not notice, it is just grant taken for granted. Then, is the performance attributes or called one dimensional attributes, one dimensional attributes means if it increases people get satisfaction, if it decreases people get dissatisfaction. So, it is that. Say for example, in a car it is fuel efficiency that or mileage in other words that if it increases people are happy, if it decreases people are dissatisfied.

Excitement attributes that is or delighting or attractive attributes which is also called attractive attributes. These attributes provide satisfaction when present, but do not cause dissatisfaction when if it is absent. It is a delighter, but if it is not present people would not mind much, which is a say back view camera in a car.

In most of the cars you will not find any back view camera, but if a car has that people would be very happy. Oh. There is a car camera, we can see the back and it is something new and good. So, that is a delight quality.

Reverse qualities, sorry before that there is a indifferent qualities, indifferent. If it is there or not there, it does not matter that suppose in the car example if I say that the designer signature is embossed on the engine, customer is hardly moved. What difference does it make to him? Nothing or say if one is getting after buying a car a packet of chocolates as a gift.

Well, that is fine, but not much when it is compared to a car, 100 rupee chocolate box how does it matter. Reverse qualities, if it is present people would be it is a reverse, if it is present people will be dissatisfied, if it is absent people will be happy. Everybody understands in a car noise and vibration will be that that; if it is present people are dissatisfied; if it is absent people are happy.

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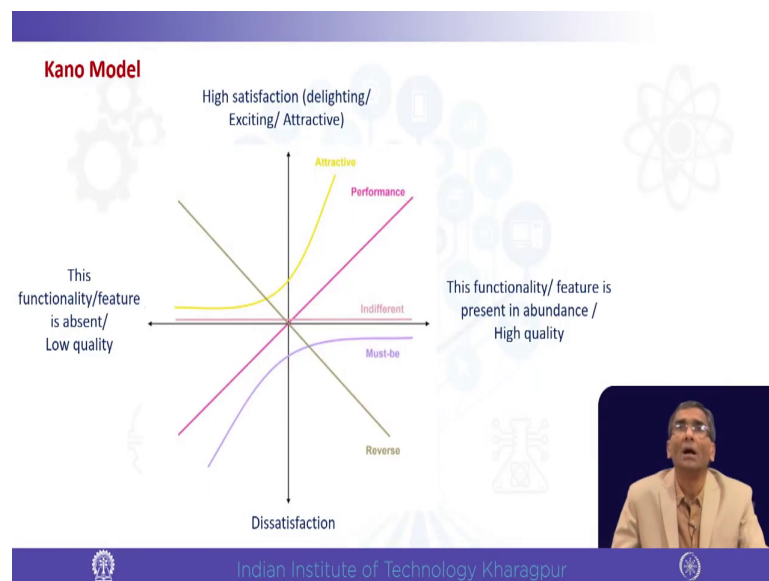
Now, if we try and visualize this concept, it would look something like this that the there are two axes. One is the dissatisfaction at the y axis; at the bottom is the dissatisfaction, on top it

is a high satisfaction or delighting or exciting or attractive. And, on the right side it is the functionality of features that is present and on the left side is the functionality or feature that is absent or in low quality available.

Now, if we see that the yellow car is showing the attractive feature that if it is absent people are not dissatisfied, but if it is present people are very happy. I have already given the example; I will give another example of a smart TV just now after this. And, then I said that performance attribute; that means, you see that say for example, mileage of a car, when it increases people are happy or in a smart TV synchronous conversion, when it increases, the upgradation performance when it increases people are happy.

And, must be is if it is not there people are dissatisfied with the this purple line you can see, but if it is present people are not minding it, the satisfaction level it does not go up much it is just there because it is taken for granted. And, what lies on the axis in a brown color is the indifferent that whether it is there or not, we have explained all this, reverse also we have explained.

So, visually if we want to see, it would be looking just like this. So, what we have explained now if we diagramically put it, it presents itself in this manner.

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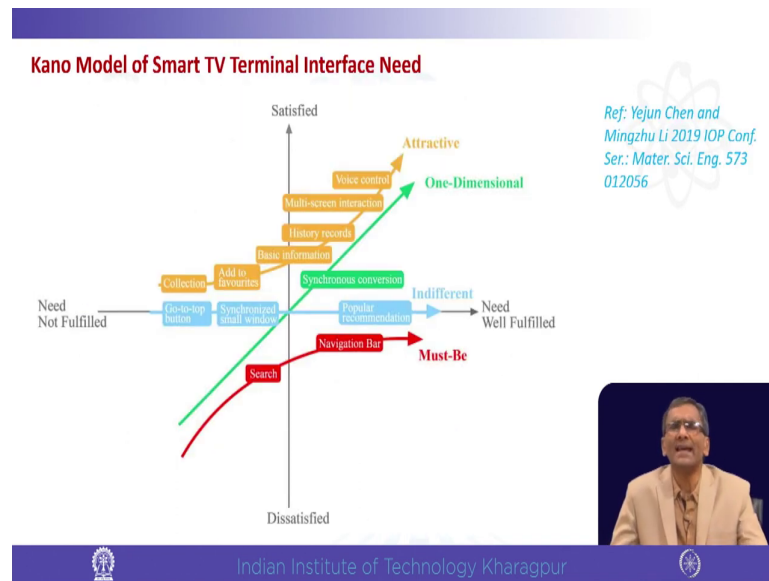
This another example as I had given the example with a car, in that model if we superimpose this example from one of the literature paper which is mentioned in the right hand corner; you will find that the search or navigation bar, this is a must be or must have kind of a thing. It has to be there by goes beyond question and, but then things like that go to top button, synchronize more windows, popular recommendation, people are indifferent about it, alright.

But, these people simply ignores, then let us talk about the delighters which is in yellow that is a collection, add to favourites, basic information; people are happy, people are satisfied. And, at the more it gets added which is which attracts them which is increasing, but if it is not there people will not be dissatisfied. But if it is present people will be highly satisfied one by one.

So, basic information, history records, multi-screen interaction, a voice control, those would be attractive features. And, as I said the synchronous conversions say for example, for upgradation of its performance is the one dimensional or performance, one dimensional or performance; it is called performance also. So, it means that if it is more if it is increasing in quality performance it is better, the less is the lesser it is the dissatisfaction is more.

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Now, if we put a feature prioritization technique evaluation table for this for a Kano model, what do you see is that? As I said that there are two things. One is that it is like it that if the feature is present and the other is feature is absent. So, where the feature is present, we called it functional. When the feature is absent, we called it dysfunctional and then there are 5 categories, 5 categories from like it to dislike it.

And so, and there are 3 in between that expect it, neutral and can tolerate say like it I like it, I expect it ok, I am neutral to it; whether it is there or not I do not care, can tolerate it, it is there I guess I do not like it much, I do not dislike so much also and finally, dislike it. So, that is the span or scale.

Now, if we put that in a matrix functional, dysfunctional matrix then we would see that each cell say for example, if I like it then and if I like it, if the if it is presence if it is present then I like it and is absence I dislike it, then it is a performance cell, which is on the right end corner. Now, for example, if we expect it, it has to be we expect it to be there and if it is not there, then we if we dislike it then it is a must have, then it is basic; one cannot miss it.

Now, that way you would see that the matrix is formed where Q means the questionable that means, which is actually in conflict with the objectives, the responses of by the customer. So, those are Q's which is not part of our assessment or evaluation except those 4 cells of Q's, we are concerned with A's, P's, M's and I's.

You will not just check which are I's and which are this. Say for example, another example if we take that if it is neutral to me, if it is present and neutral if it is absent then it is indifferent. So, this is how the indifferent must have or must be or basic etcetera are categorized are present in the matrix.

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Data Collection and Kano Analysis

5 Features, 12 Customer

Feature	Attractive	Performance	Must Have	Indifferent	Reverse
1	9 (75%)	2	1	0	0
2	0	9 (75%)	2	1	0
3	0	4	8 (67%)	0	0
4	0	2	10 (83%)	0	0
5	0	0	1	10 (83%)	1

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Now, suppose we have 5 features and suppose we have 12 responses, 12 customer responses. The responses tells us for feature 1, say 9 people from this table using this table, this table as a this matrix or table that what this for each feature, for each feature this has to be checked with each customer. So, like this 20, 25 features the product will have will be checked with the customer. So, if there are say 20 such features, say 20 such table will be filled up by each of the customer which is here in this case is 12.

So, based on this 12 say if there are 5 features as we are discussing, this table appears that feature 1 through feature 5, 9 people have said it is this feature 1 is to be categorized as attractive, 2 for performance, 1 for must have. For feature 2, 9 people said it is a performance feature, 2 said it is a must have, said means that we have derived from their responses and 1 is indifferent.

So, 3 is 8 is must have, 4 is performance, feature 4, 10 is must have, 2 is performance and for feature number 5, 1 is must have, 10 is indifferent and 1 is reverse. Reverse however, does not come in the computation of its efficiency or extent of satisfaction which we will see now.

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Now, the extent of satisfaction as I just mentioned here is expressed with the formula as available in the literature that is the extent of satisfaction is A, that is attractive features plus performance features divided by attractive plus performance plus must have plus indifferent. Now, here A plus P plus M plus I is equal to 12 as we have already seen.

Extent of dissatisfaction therefore, P plus M divided by A plus P plus M plus I into minus 1 because it is a negative this thing, that this dissatisfaction. So, minus 1 is the multiplier. Now, if we put it, we will see that this feature 1, the values are put in this table which already we

had said the value. Now, if we calculate A plus P, it is 11 on the first row for feature 1, P plus M is 3, right. A is how much? A is 9 and P is 2 so, it is 11.

Now, P is 2 and M is 1. So, 2 plus 1 is equal to 3. Now, 11 by 12 into 100 is 92 percent and 3 by 12 into 100 is 25 percent alright. So, similarly it continues through feature 2, 3, 4, 5 etcetera. Say for example, for feature 3 if feature 3 is present, then 33 percent will be satisfied and if feature 3 is absent, 100 percent people, all the customers will be dissatisfied. This is how we choose that which features should be there in the product in what. So, the explanation is already given in the bottom as I have just said, that you can check later on if you want.

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Therefore, process of prioritizing the features to be accommodate in a product. How do you do? To start we do with a must have or the basic that first it is to be accommodate in the

product, whatever the must have is. Then, the next step is to then to accommodate as many performance or one-dimensional.
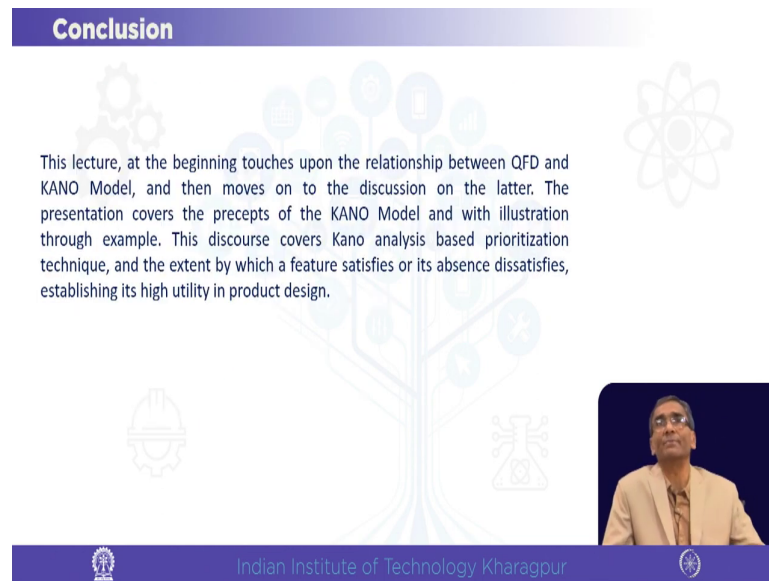
What is called one-dimensional? Because, it is a simple a straight-line equation that if it is increasing, linearly it is increasing. So, it is called one-dimensional that way, that it is if it is increases the satisfaction increases, if their value decreases, the satisfaction decreases.

So, then the performance features are accommodated. First is must have, then the performance features. Next to include is the delighting or exciting features. You see here in the in this course of discussion, I just would touch upon a point that this order tells us one thing is that first you do the basic, that is the core features and then do rest. The core features or the basic features is a very important thing because it determines the cost of the product at affordability.

And, we will discuss, keep this in mind here we are just making an initial comment and remark in a future discussion we will have that. This affordability aspect will be taken up through a discussion on affordability engineering or frugal engineering. We will take up how frugal engineering or frugal designing is to be done so, here that this feature aspect will be important to consider. So, Kano model is often used for this purpose also, in frugal engineering design that is to be borne in mind.

Now, we will come back to this, we have discussed the delighting features. Now, the necessity is to remove the reverse features if they exist. If there is at all any reverse features that must be removed, because it adds to the satisfaction. Indifferent features may be ignored or dropped because people are not caring about those features.

So, what happens is in the conclusion we may we will say is that the Kano model which we started discussing taking the Q from QFD and moved on to the Kano model and then we are discussing Kano model in agile. The feature prioritization or feature selection is a very important factor in product design. The functionality and features, the features will provide the functionality in a product and the presence of it or the selection of it actually determines many things.

In a particular category how this product will fare in a given market, in a given market segment? If the market segment is broken into classes and say as we have heard something called bottom of the pyramid, that is there in the pyramid a the top part of the pyramid is where the affordability is very high, but it is narrow, the number of customers are very less.

But, at the bottom of the pyramid, the number of customers are large. So, here the Kano model would also have to determine the type of the product suitable for a given segment. So, this analysis if particularly if it is a must have or if it is a must have, then it should be aimed for the bottom of the pyramid because the must have features means that ok with the core features or the basic features that should be in the product. And, if that is in the product, the product will function and people would be able to carry on with their work.

But, then without the additional features it is quite well understandable that the cost will be content and that is one of the best way to develop a product for that you know resource constant markets. Like the markets in India, Brazil, African countries, South Asian countries and many other parts of the even in the developed countries in the world where the bottom of the pyramid exist and they need affordability.

This is just to remember these things that when we will be discussing the frugal engineering design, why frugal engineering design is important? Particularly, because a huge population, the customer number resides in these areas, in these regions and constitutes a big market and that market is to be catered. So, for that we will take a special attention on frugal engineering as we I have just now said.

So, this discourse talks about those feature prioritization. This discourse covers Kano analysis based on prioritization technique and the extent by which feature satisfies or its absence dissatisfies, establishing its high utility in product design. So, this is what the take away from this session and the study can be done from the notes, the discussion notes.

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And so, here I am sure that you have benefited and can use this model usefully effectively in your actual workplace.

Thank you so much.