E Business
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Lecture-56
Dynamic Pricing

So we continue with our discussion on decision support in online environment. In this series we have already seen about 2 different settings; in the first setting we had the data source as our access log which is collected from web transactions with the transaction of this HTTP because of HTTP request and response it is generated and how it is used for 2 specific decision support situation for modelling user behaviour and for capacity planning we have seen. Then the next thing we saw about another data source that is the user rating data generated either explicitly or collected implicitly then item data and your user demographic data and we saw that how these 3 data sources can be used for generating recommendation.

So in this recommender system we learned that we can I mean the we can actually provide decision support to the buyer, assistant to the buyer just like we provide assistant just like our salesmen provide assistance to the to the to the customers in a store by suggesting different items okay. So, as if you remember our discussion on decision support system, in decision support system we learnt, decision support systems are of 2 types, one is model driven, second one is data driven. The last 2 type of decision support system that is recommender system and the ones using that access log file those were modelled driven decision support situations sorry data driven decision support system.

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Today, I mean not today in this series of lectures we are going to learn about auctions where we will see how exactly model driven decision support systems are implemented. Before we will about auctions which is basically price discovery mechanism, we are in general going to talk about pricing and typically dynamic pricing, auction is a dynamic pricing mechanism to discover prices. So in this lecture we are going to learn about the concept of a market and scope for dynamic pricing then we are going to learn about the e-commerce, how e-commerce is helping in taking dynamic pricing decisions and various dynamic pricing situations.

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Now, concept of market, pricing, auction, all these are, all this very much belong to economic domain, specifically your microeconomics. But because of recent because of the adoption of auctions more recently in an online environment has increased the interest of the e-business community e-business or information systems community for a knowing more about auctions and knowing how exactly those decision support models can be implemented online, so therefore before we actually go for auctions we are going to discuss little bit on pricing and all and the basic concepts behind all this. So what is market? A market is a mechanism through which the buyer and the sellers interact to determine the prices and exchange of goods I mean both goods and services.

Now this prices coordinate the decisions of producers and consumers, high prices tend to reduce consumer purchase and encourage production. Similarly low prices encourage consumption and discourages production and this prices are balance wheel of market

mechanism. Now, how these prices are determine in the market? It is determined because of the market equilibrium, now what is market equilibrium?

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Market equilibrium comes at a price at which the quantity supplied is the quantity demanded okay. The market demand that is demand by all individuals change over the time, so also the supply so if the price if the price is determined because of the equilibrium of demand and supply and if the supply and demand change over the time, the price has to change.

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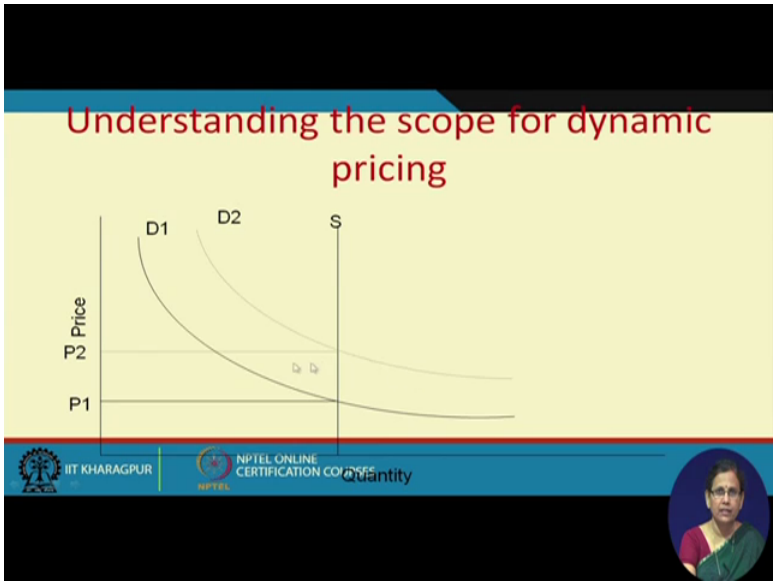

However traditional the prices are, this is what I was telling you, traditional the prices are fixed but this is what I was telling you, keeping supply fixed if the demand increases so also the price.

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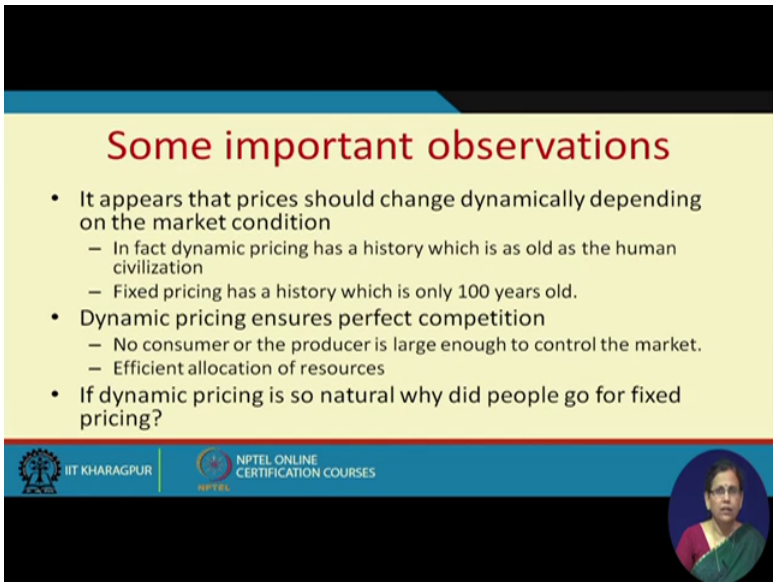

So therefore, even if the even if we understand that price is price is so dynamic in the free market depending on the demand and supply condition, the price has to be dynamic, people actually prefer for fixed pricing in fact nowadays people go for fixed pricing. However if you look at history, dynamic pricing starting from your old I mean barter system, etc, it is a very oldest phenomena and it ensures perfect I mean it is the result of perfect competition within the market. However, this fixed pricing is a very newer phenomenon probably some hundred years old however, people go for fixed pricing because of many reasons.

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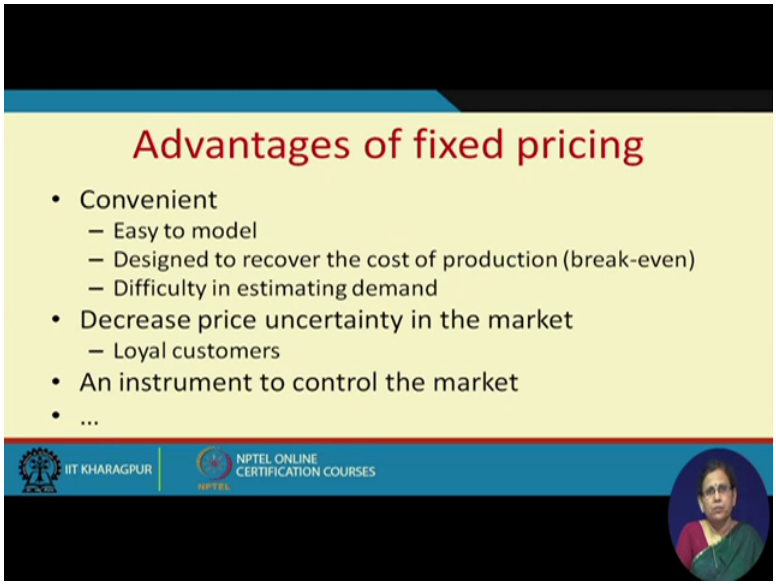

It is convenient, it is easy to model, it is easy to easy to implement and using this you can have your plan to recover the cost of production, you can find out the breakeven point. And dynamic pricing is difficult because estimating the demand is not that easy, theoretically you can say that price depends on demand and supply but estimating the demand is extremely difficult. Then fixed price is also preferred because it decreases price uncertainty in the market and creates loyal customers and it is also used many times as a market control mechanism. Many times the government for example the government can actually decide to control the market and decide the price, otherwise even then sometimes if the items are not available, the essential goods are not available, the price can become very high which is prevented by regulations.

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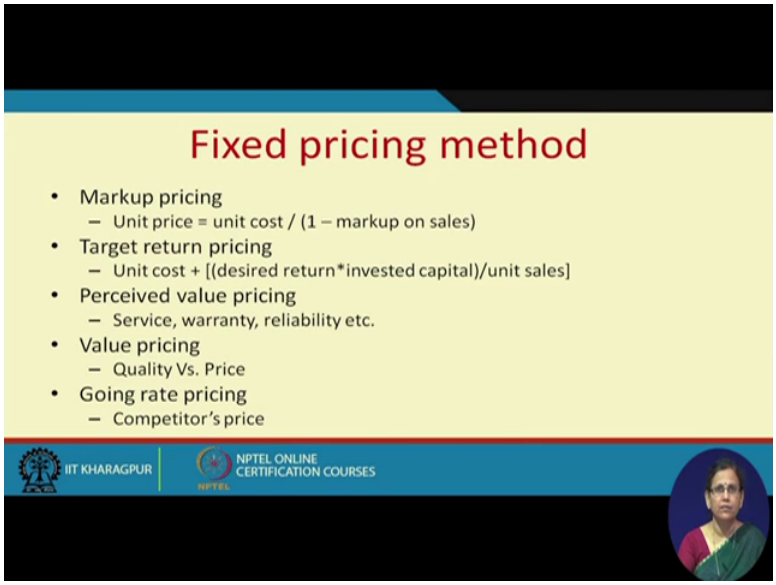

In fact there are many fixed pricing models, if you can read about them from your traditional marketing literature or from economic literature. They are very simple and they help to to decide how to breakeven, how to extract money from the market and so on. So these can be markup price where unit price is decided by unit cost divided by 1 minus markup that you decide. Then you have target return pricing which is the unit cost + your desired return into investment capital divided by unit sales and so on. Similarly, it can be depending on I mean it is not only these values but depending on the other services that you provide and warranty, availability, et cetera, you can charge even more.

If you can provide better products better quality products, at least you established in the market that you provide quality products then in that case you can have this value pricing, perceived value pricing then you can have going rate pricing, you can follow up your competitors and decide a price.

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However, if you look at this traditional fixed pricing method, they are also not truly fixed. You provide volume discount after a fixed price MRP, sometimes you go for negotiation, if you buy many products together or multiple units together I mean many different kind of products together then you get sometimes you get even lower price. If there is any promotion you get items at a lower price or get multiple items together with same price, so therefore traditional pricing in the true sense is also not fixed.

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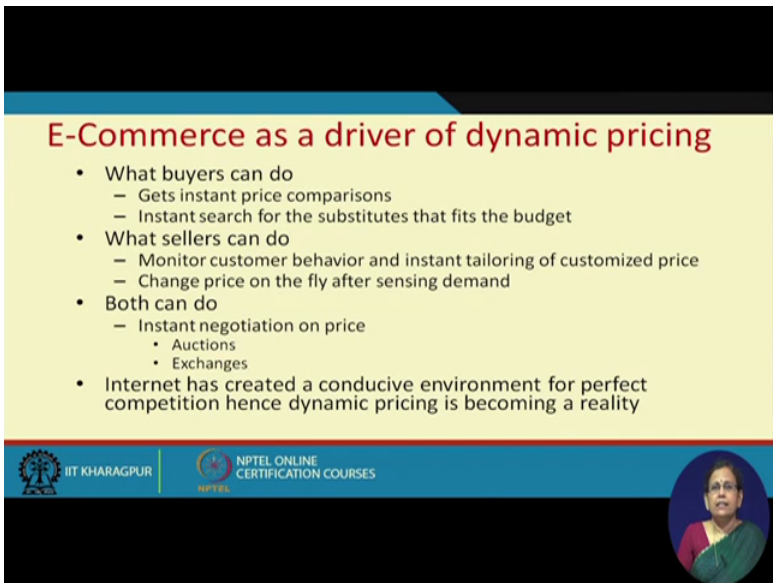

But e-commerce has really made it possible to ease the way the dynamic pricing was implemented, how it is done let us try to figure out. Here the buyers both buyers and sellers have many freedoms, what are they? The buyers can get instant price comparison, they can

instantly search for the substitute in the market which fix their budget because search has, they can easily go, it is not that physically they are going from one store to other, virtually they can sitting in front of the computer they can go from one store to the other.

The sellers can now monitor the user behaviour and they can instantly tailor the customised prices, so when they sense when the demand is more they increase the price, when the demand is less the price can be decreased. Now both of them then I mean the sites can provide facilities where both the parties, these buyers and sellers they can negotiate together in the form of auctions or exchanges. Somehow the internet has created a conducive environment for perfect competition hence dynamic pricing is becoming a reality.

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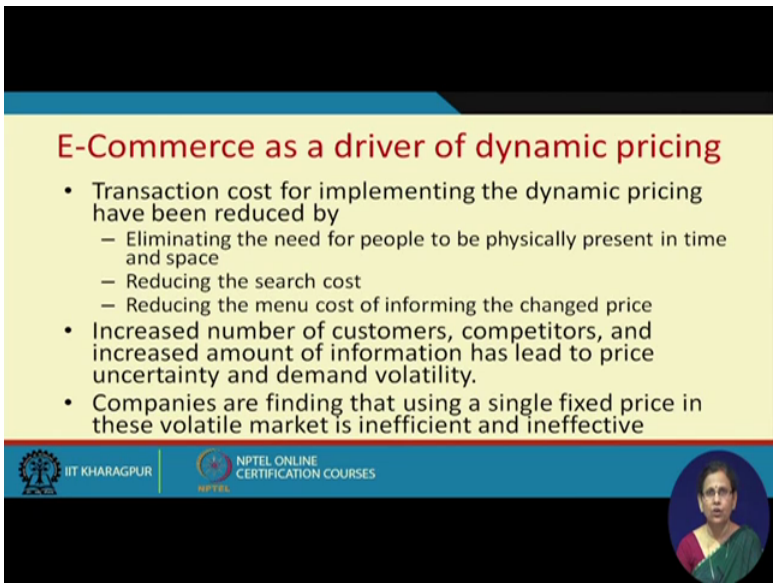

Now the transaction cost for implementing dynamic pricing has been reduced because of this information, communication technology. So here the it has I mean the it has eliminated the need for the people to be physically present in time and space to see the product in a particular store at a particular time to see the product, it has reduced the search cost, it has reduced the menu cost, by menu cost we mean, you see traditionally in traditional fixed pricing setting assuming that there is no Internet, how the informers know about the pricing was getting disseminated, by brochures where the details of the products and price is printed.

Now preparing this physical documents needs time but if on the Internet environment if the demand is sensed, then price can be dynamically set through some computer program so therefore, changing this menu cost and informing the customers about the changed prices have become very easy. Then increased number of customers, competitors and increased

amount of information leads to the price uncertainty and demand volatility in the market. So in this environment the companies are finding that using a fixed price is not efficient and effective, so as a result they are going for dynamic pricing, now what is dynamic pricing?

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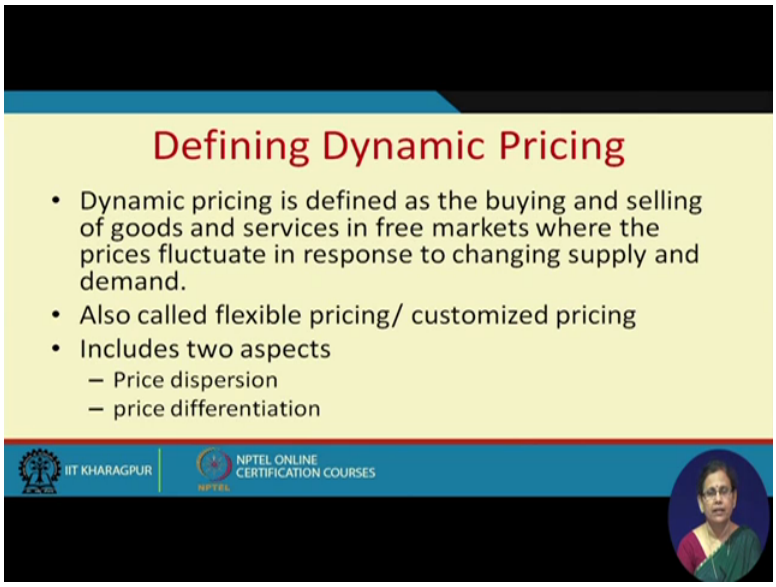

Dynamic pricing is defined as the of buying and selling of goods and services in a free market where the prices fluctuate in response to the changing supply and demand. It is also called flexible pricing or customised pricing, it includes 2 aspects; price dispersion and price differentiation let us individually see what are they.

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Coming to price dispersion, either you can have a spatial dispersion or you can have a temporal dispersion. By partial dispersion we mean at the same time for a given item you can have different price offers from different sellers. Think about air ticket, air tickets in various sites will be shown at a particular time with different prices, it is possible. Similarly, a single seller can vary the price over the time after seeing the demand and seeing various environmental factors. For example, if the buyers sees that buyer observes that the price in a particular selling season let us say during Diwali, you can sell more so it shows a lower price so that he can generate the same revenue if the sales volume is more.

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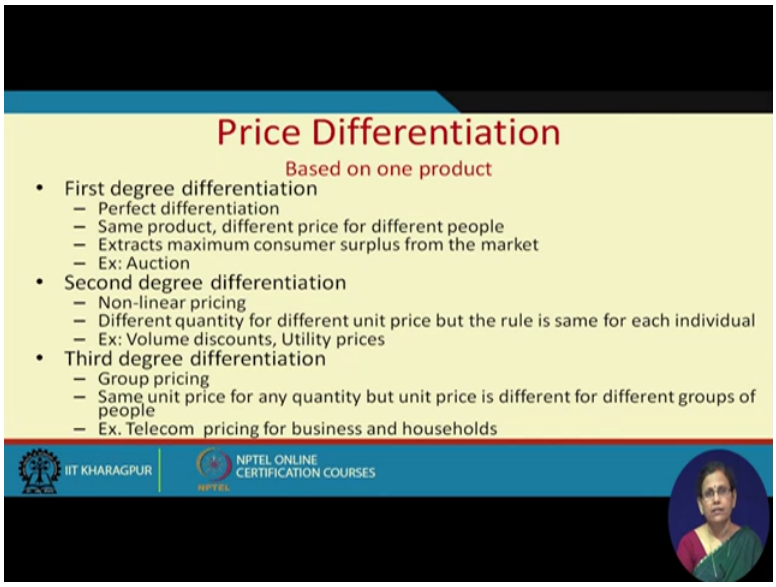

Then next dimension is price differentiation. Now this differentiation can be of 3 types; first degree differentiation, second-degree differentiation and third-degree differentiation. In case of first degree differentiation which is the result of perfect competition and perfect differentiation, you can for the same product, the same product will value differently to different users, I mean the users, the buyers will be competing among themselves and they can decide the market price. So this is an example of perfect differentiation, it is about same product with different prices for different people. The exact maximum and consumer surplus from the the maximum surplus from the market is extracted using such mechanisms an auction is one such mechanism.

The next one is your second-degree differentiation, it is also a dynamic pricing way of the price can be made dynamic. Think of providing volume discount or providing utility prices depending on the uses. Here you adopt a non-linear pricing strategy with different quantities you provide different quantities you provide with different unit prices. But the rule is same

for each individuals, whether I buy or you buy everybody has to follow this rule only based on based on my type of purchase, amount I purchase the price varies.

The next one is your third-degree differentiation which is about group pricing. Think of providing different prices the offering by Railways for different groups, for senior citizen one price, for students another price and so on. So similarly you can you can imagine that your telecom prices or certain other commodity prices different are different for different settings, for business organisation it is one setting, for business purposes it is one setting one price and for your regular consumers it is another price.

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Then this price differentiation can be based on one product and can be customised. So here you can add, you can have you can make the price differences possible by adding or subtracting attributes. Just think of a think of some kind of products which is customisable like that of Dell computers, you can add more features or remove some of the features and you are like to get a customised product with with the price offering which suits your pocket.

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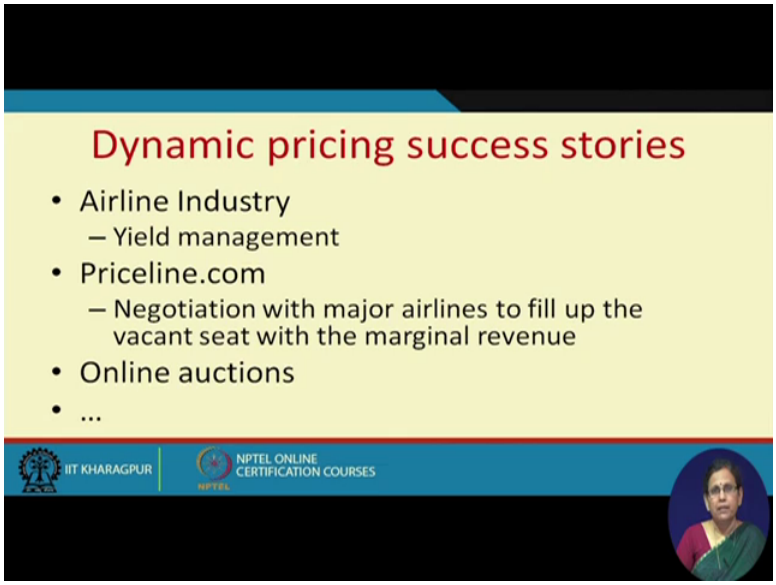

So there are many dynamic pricing success stories in the online environment for example, one of the very oldest example of this dynamic pricing after sensing depending on the demand and supply condition is your the air ticket pricing. So this particular string is called yield management, you must have seen how frequently the air ticket price changes and finally when it goes for auction. The last moment if some seats are remaining vacant, it goes for auction. Similarly, another example is the priceline.com which where the negotiation with major airlines takes place to fill up the vacant seats with marginal revenue, then your online auctions on Ebay and reverse auctions, these are some of the success stories of dynamic pricing.

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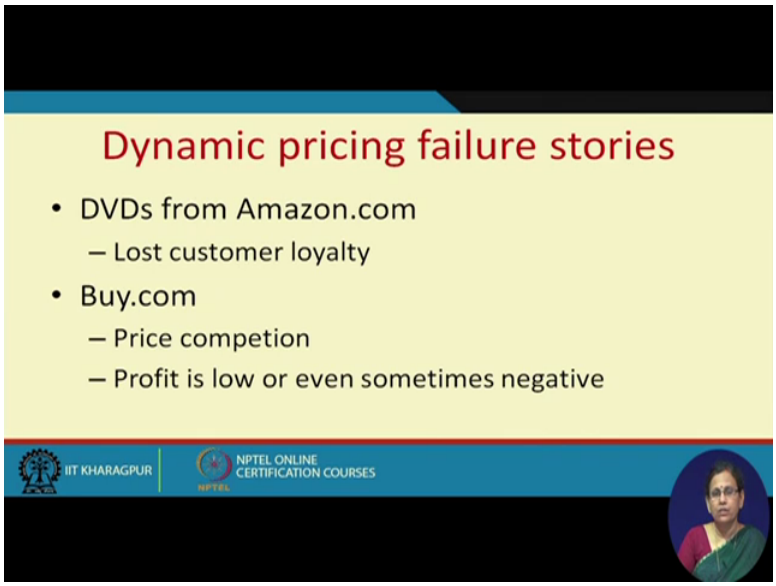

There are some failure stories as well for example, once upon a time quite some time in the earlier days when this dynamic pricing was adopted by online community, Amazon tried selling its DVDs at by sensing the demand, where the demand was high it had some kind of algorithm it decided a price and the CDs were sold at a high price, next moment it was shown if the demand reduces and it was sold at a very low price. So as a result there was a lot of confusion in the market and there were lots of customer complaints so Amazon finally removed that particular strategy.

Then another failure story is the Buy.com, so this buy.com what it was doing, it was actually taking the taking the prices of its competitors and it was taking the prices of its competitors and it was trying to offer a price which is lowest among all the available prices. So as a result the sometimes the profit was becoming very low and because of this strategy because of this strategy the site actually generated negative profit and eventually they went out of the market and this is one of the very early stories. Now let us try to figure out under what conditions this dynamic pricing will be successful.

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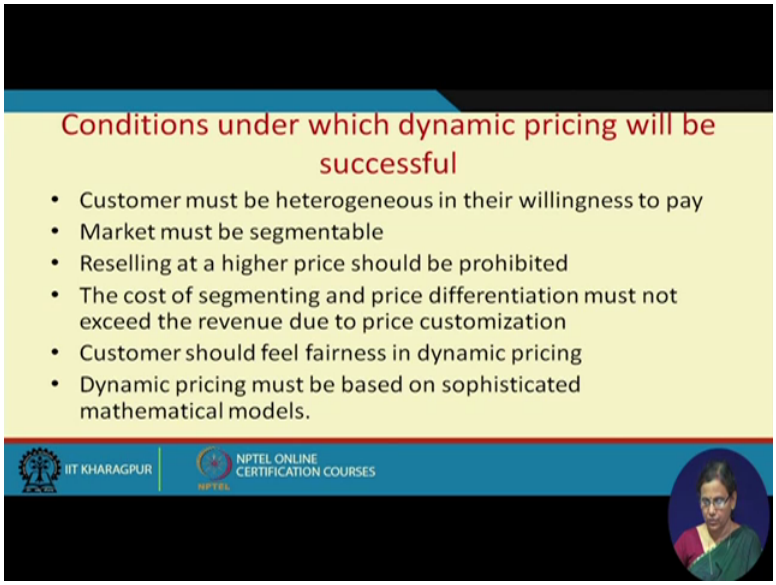

So dynamic pricing there are few conditions under which the dynamic pricing will be successful. First of all, the customer must be heterogeneous in their willingness to pay, what do you mean by being heterogeneous in their willingness to pay? Say, if the railway is introducing railway has this scheme that senior citizens, students and regular regular travellers they will have different prices, do you have any objection? No, because we understand that this category of people should get benefit the students and this thing, so we are actually heterogeneous in our willingness to pay so dynamic pricing is possible. Air

ticket, even if the price varies we are willing to buy because it is need-based, even if the price is high sometimes because we need the ticket urgently we buy.

Then the market must be segmentable, again back to your railway example. If the prices are offered, different prices are offered to 3 groups, why they are offered because you have 3 distinct segments which can have different prices okay. Then the third one is reselling at a higher price should be prohibited, which means if a student buys railway ticket he should not be going and selling, he has got it at a cheaper price, he should not be going and selling it at a higher price it should be prohibited. Or you are getting an airline ticket, you have booked your ticket very early and you have got a very good deal, it is not that after it is over I mean when the prices are actually very high, you can sell it to somebody else, so that should be prohibited.

Now the cost of segmentation and price differentiation must not exceed the revenue due to price customisation, here your ICT plays a role. When the price changes say in case of airline ticket or in case of auction in Ebay, when the price changes in the market because it is online you are immediately informed and the cost of informing the concerned customers or individuals is not very high. Had it been very high in this sense let us say railway has to every time has to print some brochures and give it to its travellers; it would have been a very costly affair. So if the revenue generated is higher than the price of customisation, higher than the cost of price customisation then it is advantageous.

Then customers should feel fairness in dynamic pricing, again your Railway example comes into picture. If senior citizens are getting advantage, we are not unhappy because we know that it is fair to provide the ticket at a cheaper price to the senior citizen. Then dynamic pricing must be based on sophisticated mathematical models.

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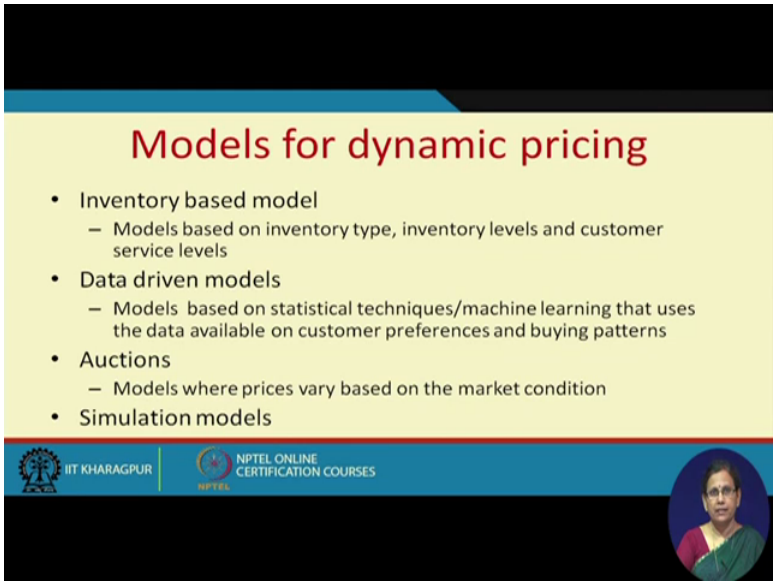

So there are many models for dynamic pricing, your inventory based model, your inventory base models like that of your yield management how much inventory is left with me, here the inventory is your number of seats available. So those yield management models you can say they are inventory kind of model. There can be some data driven model where the customer's preferences, buying pattern, their etc can be used, the demand can be sensed so that market can be segmented and prices can be offered according to various settings. Then your auctions, here the auctions are the models where the prices vary based on the market condition, depending on the supply and the demand conditions the prices vary.

You can also have simulation models for dynamic pricing, so these are some of the methods out of which now you are going to know more about the auctions. Thank you very much next class we will be talking on auctions in general then we will talk about online auctions, thank you very much.