Management of New Products and Services (MNPS)
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Lecture - 15
NPNSM - Diffusion process and Product Life Cycle

Hello. I am Jayanta Chatterjee. We are discussing management of new products and services. This very interesting topic called the spread of new products. Now, in the earlier 2 sessions, I have been discussing about estimating sales of a new product and we discussed some conventional approaches to that the most used approaches the statistical techniques briefly some simple statistical techniques etcetera we discussed.

At that point of time, I had mentioned number of times and then I am going to spend some time on that particular issue today is that not all products behave in the same way in the marketplace when they are launched new products. The spread of a new product will be will be different in different circumstances, some terminologies, I want to introduce here the first one is called diffusion and diffusion basically means the process by which the adoption of an innovation a new product spreads ok.

So, this is called diffusion and diffusion as you know the English word, if you look into the dictionary, it means a process which is kind of a spreading. So, if you there is water on one side and if you actually have some kind of a filter, then as you know; that water sort of diffuses through the filter and in way, you can therefore, think about this process of spreading a new product is going through different kinds of filters one kind of filter I introduced to you in that atar model that we discussed that is of a total possible number of buyers how many of are aware of your product that is a filter how many of them have actually tried or your product through some trial pack or trial item that you might have given sample or have seen a trial at some exhibition or some demonstration they are therefore, both likely buyers. So, that is another kind of filter.

Then there may be a certain number of people aware and certain number of people who have tried or seen a trial, but the product is not available to them. So, then availability becomes another kind of filter and therefore, these determine your rate of diffusion, but there are other issues that actually determine the rate of diffusion to understand that one of the things that you need to understand is that the different kinds of people who buy a

new product at different stages, this concept of product lifecycle, we have raised number of times earlier ah, but we are going to discuss it in depth today.

So, we have these 5 kinds of adopters that we normally describe innovators early adopters early majority late majority and laggards the adoption rate these are the 5 different classes of adopters and they are classified according to characteristics, we will discuss those characteristics so that you understand and that who you should actually approach first for your product the innovators and what are their characteristics.

Then what features are needed in your product. So, that the product graduates to the next stage etcetera we will discuss that in more detail, but let us look at another set of complex concept this is a very well structured excellent research influential research by Rogers and this is called the dimensions 5 dimensions of products characteristics that influence the rate of adoption.

The first one is complexity and this if you remember I had mentioned in an earlier session that there are products today who are which are highly complex like say handheld camera or the camera inside your telephone if you open the phone inside your mobile phone if you open the phone and look at that camera portion you will see what level of miniaturization and complexity its one of the most complex products that today's smartphones are some of the most complex products ever designed developed and manufactured by human beings.

But its use the user interface is a child's play. So, even children as you know can very easily use smartphones. In fact, the children can use the smartphones even better than some of the older people who may have different kind of legacy in their mind that how to use a phone. So, they have a preconceived notion that what a phone should be like, but somebody who has never used a phone a child, young child can very easily grasp the methodology or the user interface of a smartphone. So, this is the point that complexity can be there inside, but if the user interface is not simple and this is actually a paradox; that means, the more complex the product the more simple should be the user interface for that product to succeed.

So, here are actually it is a duality we say complexity, but I would like you to think about it at complexity dash simplicity. So, which means that complexity inside simplicity outside that makes a product rate of adoption higher the next point is compatibility, this

compatibility means actually it can be expanded to say backward compatibility; that means, a phone is to be used as a you know as an instrument that you put next to your ear to hear right.

Now, as we are approaching you have already seen today everybody. So, many people are using that there is a small Bluetooth earpiece in the inserted in the ear sometimes they even look like a hear ring small like a jewelry here and that actually is through which the person is hearing. So, you will see people walking on the street and talking as if they are talking to themselves, but they are actually using this Bluetooth device to hear as well as to speak.

Now, interesting point about this backward compatibility there are movies science fiction movies where people actually even eliminate this earpiece the device they actually make it as if it is possible for you to hear due to some implant inside your ear you know that you are actually able to make calls, but even there you will see people actually the connectors will put their finger here to here to. So, this actually is nothing, but representing the backward compatibility of the phone instrument the big one which we used to have you know where you have a earpiece here and a mouthpiece here. So, there that use we used to hold like this and that that was a big device then that has given way to today's you know kind of a phone which you can see, it does not have that earpiece, it does not have that mouthpiece, but we still hold it like this right.

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Now, I can make it smaller and smaller I will still hold it then I can actually eliminate this altogether and it is in my bag or in my pocket and I have now put a small earpiece here for communicating with this device. Now, suppose I eliminate even that device, but even then you will see people are using the hand like this in a in a science fiction movie; that means, that we can accept a complete radically new product, but there has to be some backward compatibility with the way we have used that product earlier right like for example, say this chair I am sitting on.

Now, if today I come up with a new kind of chair and that technology is coming where it does not need to have all these legs and everything, it is actually a device which may be a sort of floating you know suppose in sometime in the future like as if shown in science fiction movies we have something like flubber which is you know defies gravity and its made this chair is suppose make made of flubber which means it can float it does not need legs to support itself.

But even then, it will retain in some way this shape, it may have it may have no back, but it will still have a seat because we need to have some kind of backward compatibility familiarity with the way we have used that particular device or product idea. So, you see if a product is completely radically different then it often has problem of acceptance that is why today, we know that highly successful products like PDs personal digital assistant which we had a very successful range of products called palm pilot and so on and so forth that product has given way all those features are now integrated into this.

But many of these where earlier introduced in a product which was introduced by one of the most innovative companies in the world today apple they introduced this product called Newton, but that product failed because in many ways, it did not have that backward compatibility of how people were used to have assistance by you know this diary.

In which I actually write, right, this is my in a way my, the predecessor to the digital assistant which is today in built into this phone.

Now, what happened was why the new Newton was not successful and the palm pilot was hugely successful he is because the palm pilot what it did was it the; obviously, the name palm means it actually could be held in your palm. So, it was a device which was even smaller than this maybe half of the size.

But the fantastic thing it had it had a stylus you know a small stick like it looked like a and it had the software where it allowed you to write just like handwriting on the screen which is no big deal now who you have it in. So, many smartphones and tablets you have that already, but when it was introduced that particular feature that it had the backward compatibility of a diary writing. So, it was hugely more successful compared to digital diaries which preceded the palm pilot and the PDA of Newton that preceded that.

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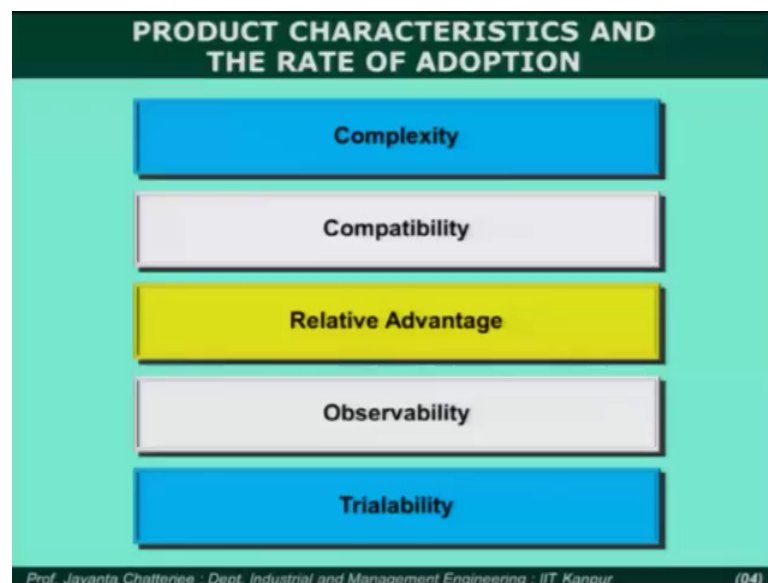
So, this backward compatibility of a new product behaving as if it is the earlier generation product often is very important. So, you see for example, the camera that is there in built in this. Now today, we are all used to taking a shot looking into the picture here right that lens is here, but initially they actually created in a way. So, that it you almost as if you are actually focusing with the camera that particular compatibility was provided today we are now that we are more used to using this as a camera device we have done away with this thing about looking through the viewfinder.

But the earlier stage that compatibility had to be provided we see this in. So, many different areas that that is why computers sometimes deliberately have devices which could be different like for example, you know this keyboard this keyboard actually people have designed much more advanced type of keyboard more ergonomic more scientific in layout of these keys people have even come up with other devices where there are no keys right, but you see why the keyboard is made like this because it has backward compatibility with the device that preceded this.

This is the typewriter. So, that qwerty that q w e r t y type of that arrangement we never did away with that arrangement because. So, many people are used to that particular interface. So, the computer actually does not need this interface you can actually, now you know you can speak into the computer and that will do the there is no need, but people still many many people still want this backward compatibility.

So, you and an even keys, for example, you know you press the key and it actually kind of goes down and then comes up or. So, sometime we actually deliberately introduce sound, for example, this phone when it takes a picture there is no shutter which used to be there in the earlier cameras, but just for the comfort of users it still makes that shutter sound you know that you have taken a picture it is a kind of a positive feedback from the device to the user that, there is a actually an action has been completed.

So, whether this key which goes down and comes up the design of the keyboard, the shutter sound that comes from this these are all examples of backward compatibility which makes a new product more acceptable because people are used to that particular way of using. So, particularly, there are people who have used the earlier cameras for them that shutter sound is very important maybe a child who is born today, who has never used the earlier kind of camera which makes that click sound and etcetera will not bother , but if you are introducing a new product and for the diffusion rate where you are actually trying to appeal to existing customers of alternate devices or earlier devices or substitutions you must understand that you cannot completely get away and from the earlier past. So, that is why we call it backward compatibility.

The third point that it may be backward compatible it may still make that clicking sound the shutter sound, but unless it has some clearly double stated relative advantage. So, therefore, this relative advantage and the next point observability they are kind of related. So, the it has to offer advantage and it should be observable.

So, you see for example, I mean we do provide the clicking sound and all that, but that this camera is far more superior in certain ways is that I can actually you know it is just used by fingers and as if I am actually saying voila magic and you know my image expands I do like this and the image contracts I want to increase my zoom, I just use my fingers and touch on this.

These are relative advantages compared to the earlier cameras where I had to do all kinds of arrangements focusing that has given way to such simple gestures and today actually I need to touch and do this, but I am sure already you I am seeing it where I do not even have to touch it, I can actually just do like this and it will expand I can actually speak to my voice assistant here and say zoom and it will zoom.

Let us say focus and it will focus or all that kind of thing I know I can do to the voice assistance. Now in some of the advanced devices and this kind of observable relative advantage will come more and more which will make this new product more and more acceptable.

So, you need to provide backward compatibility, but paradoxically you also need to demonstrate very clearly observable relative advantage and lastly, this is very important point trialability the more you make the new product available. So, you see once I have this product and I am I love it and I tell others and they I tell them that it see how I can take this picture and. So, let me see and that person takes a picture that person actually is now part of a trial and gets hooked to it right and say let me have a camera feature in my phone.

So, people who initially said no, no, I do not need a camera in my phone, I mean I have experienced it with my relatives and my wife says what will I do with the camera, but once she participated in some of the picture taking episodes and saw how easy, it is to take a picture he she saw how easy it is to edit a picture after it has been taken how easy it is that you take a picture and put it on Facebook immediately to share with friends and relatives, then she also says let me have a camera phone.

So, this is what we call trialability that makes people if you have really good observable relative advantages, you have to allow people to experience that observable relative advantage. So, complexity and simplicity together paradoxically together complexity inside simplicity outside compatibility with what was there. So, what if must have some relationship with what is. So, if you come up with a new feature remember that it cannot be completely a departure, it has to still relate to the huge base that may be there of the existing type of devices and then relative advantage must be observable they must come together and you have to make more and more people try this relative advantage.

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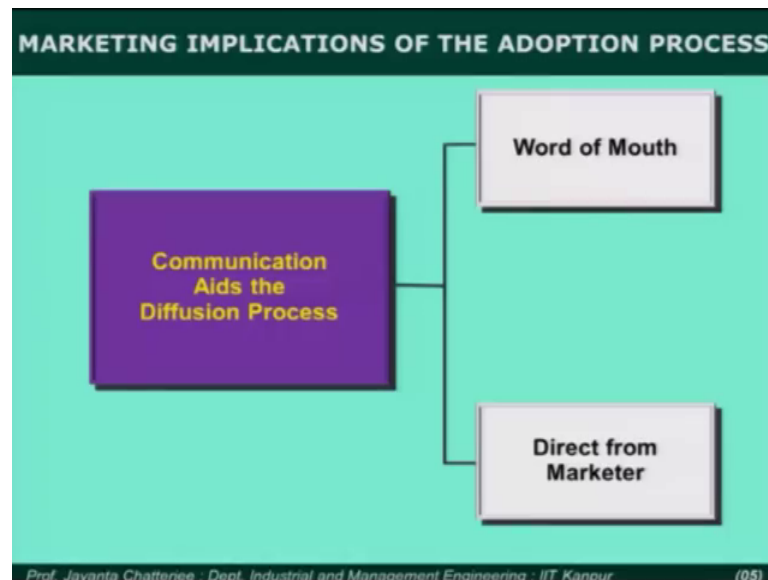
These are the 5 processes that make the rate of adoption of a new product faster a derivative of that is that communication aids diffusion communication are 2 types one is communication that are created by the marketers themselves all the promotions that have happened and as we know today in even more powerful because people intending users will often discount the message the communication that is coming from the marketer because we have a kind of in a in a little bit of distrust on all kinds of marketing messages because there are too many of them and many of them are false. So, as a result do not entirely believe we say oh that is a sale stock or we can. So, that is just a marketing pitch.

So, word of mouth from existing users today therefore that is why social media has become. So, much more powerful in terms of influencing the rate of adoption of a new product and. So, these 2 factors together will actually influence. So, if you actually mathematically create an equation for the rate of adoption then you will see the 2 major components of the. So, if the rate of adoption is on the left hand side on the other side of the equation the 2 major factors which will be they are associated with some other mathematical variables will be these 2 things word of mouth and message created by your own marketing effort.

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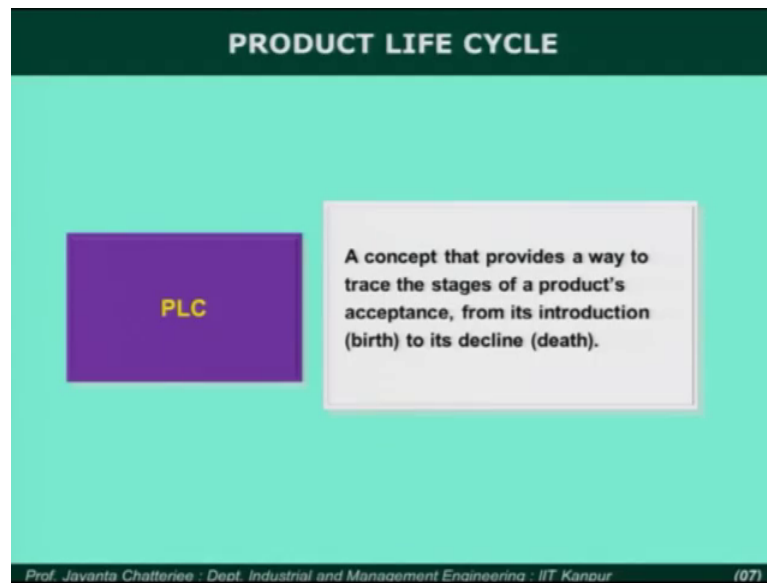
Now, from this, we move to product lifecycle this product lifecycle is therefore,; that means, the rate of adoption now we know that what influences the rate of adoption and applying that we can also understand particularly by understanding this normal distribution of the product lifecycle product lifecycle a diagram we can understand that certain amount of estimates can be made mathematical projections can be made about possible sales even from that particular shape.

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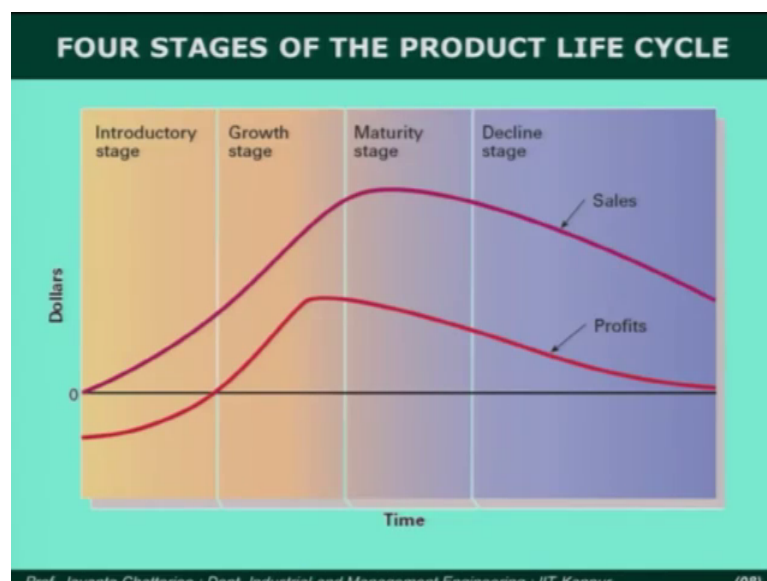
So, as I discussed earlier and that usually this is the normal structure of the plc this is what we call this side is dollars rupees yens or Euros whatever; that means the building up of sales profits and everything. So, say if this is the sales line then this will be the profit line here the sale starts here, but at that stage the profit is negative that is because there is already a lot of expenses are gone in developing the new product that is why at the 0 state of sales; that means, the starting point of sales you already have incurred expenditure which is recovered only over a period of time that is why it starts from a negative point here where whereas, this starts from the origin 0.

So, this is the sales graph then the profits graph as you see kind of follows the same shape and trend. So, this is the introductory stage growth stage maturity decline and all these we have discussed and this is all against time on x axis not all graphs lifecycle graphs are nicely shaped like this as I mentioned in the previous session that there are different shapes to this.

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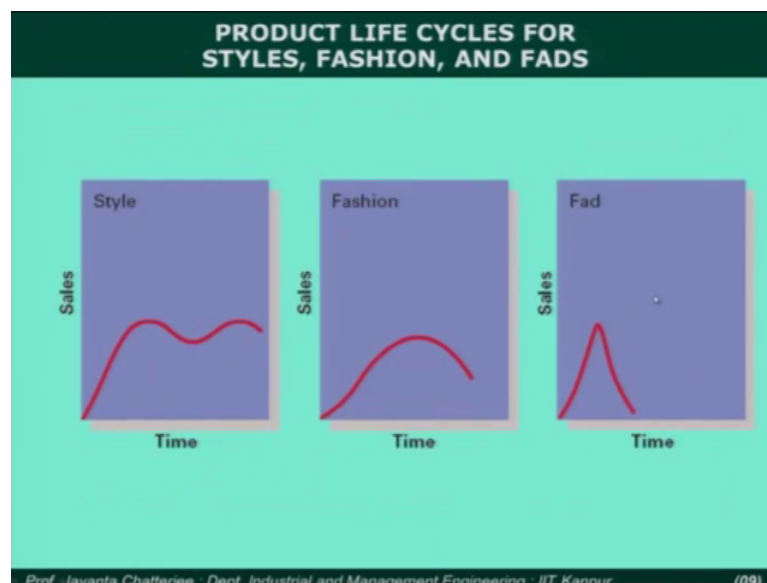
Ah for example, this is called the style and you see this graph this actually you know goes up , then comes down and then again it comes up because we all know that how styles actually like history repeats.

So, we had you know like trousers I think you have all seen it people who are of my age that in our young days before our you know early stage we had trousers which were called drain pipes they were absolutely hugging the legs and that is why they were called

drain pipes they were like absolutely tight and it is were very pop you can see drain pipes when rock singers like Elvis Presley and others if you see their video you will see in those days or even in cowboy movies the stars they had those kind of because they were like the jeans of that time very hugging the leg.

Then came something that was again introduced to the movies and became fashionable around the world they were called bell bots or bell bottom because they were actually shaped instead of hugging the legs, they actually flared towards the bottom that is why they called bell bottom they actually liked the column and then shaped out.

Then again it be narrower, now again I see they are flaring out maybe not that much as it used to happen in the bell bottoms, but now it is again flaring up. So, style often repeats itself you know so that is why the style graph the products which are related to style; that means, Aperales often will follow this also happens in style of movie plots in many things you will see. So, therefore, there will be a period when the romantic movies are successful then at certain point these people are bored with romantic movies. So, suddenly we will find that instead of romantic movies have been replaced by adventure movies horror movies or and then again at certain point of time, suddenly, the romantic movie comes back, but this time maybe in combination with thriller.

So, a a thriller come a romantic movie. So, it is a it is a romance, but where people are going through a lot of Topsy. Turvy lot of adventure hitch cock made some very brilliant movies of that type of. So, the point is that this is a repeating not exactly same, but repeating plc product lifecycle graph then fashion, fashion, you see is goes up then it dies down and a a almost associated is fad this is it rises rapidly and then falls as I was discussing in a previous session many of the our popular Hindi movies Bollywood movies are or most movies today because of this multiplex economics..

So, there are a movies released today instead of earlier they used to be released in a city in maybe 3 movie halls today they are simultaneously there are hundred screens in a particular city even a name in a tire tier to tier 3 town there will be 5-6 screens which will be showing the movies. So, there will be 24 30 shows in a day.

So, people will see them and therefore, most people who are the intended audience the target segment there will be covered very rapidly. So, therefore, the sales will peak in the

first 4-6 weeks this is the nature of most movies today and then over the next 4 weeks they will just pitter out there will be gone.

So, very few movies today run for more than 12 14 weeks most finish in 8 weeks. So, that is why this is now interestingly this is fad earlier this was associated with this kind of you know style of dressing jewelry watches and or movie, but even high technology products like say semiconductors, they actually almost follow the same lifecycle; that means, the semiconductor products are introduced and very rapidly, they are accepted and then they are actually replaced by the next generation.

So, the life of a semiconductor chip today is something like 6-8 months or maybe a year even though it takes maybe 3 years of r and d to produce the next generation of chips. So, you can see how much challenge therefore, that means, you are taking 3 years during that time. So, many changes are happening so; that means, by the time actually you have finished one particular development that requirement may be gone it.

So, that is why actually in high technology today you may have 3, 4, 5 parallel development projects going side by side.

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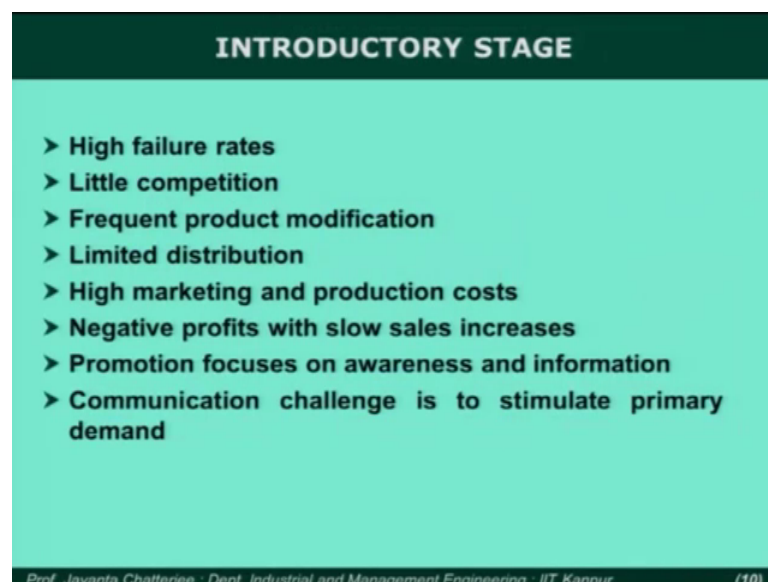
Because you do not know where it will be ; so, to summarize, I am now going to put some words to these different stages introductory stage high failure rate very little competition because there are very few players at that stage because it is new frequent

product modification that is what I was just now talking about the say semiconductor products that during the early stage there may be you know a lot of changes happening because by that time, it has taken 3 years or 2 years to develop that product , but the world has changed during that time. So, that is why you need to make frequent product modification.

I will discuss in more detail a concept which is very important for new product business today which is called pivoting; that means, this modification may be not only needed in the product, but the way you do business or what exactly is your definition of business all that needs to also have frequent modification at the early stage introductory stage your distribution will be limited. So, that is why we said again and again that remember in the beginning you must have a very sharp focus where you are going to start the business high marketing and production cost because your volume is low as it is demonstrated by this graph that in the early stage sorry here you see therefore, your distribution is low your costs are high your production costs introduction cost marketing all these are per unit quite high at this stage.

So, the negative profits happen because you have already incurred developmental costs and the rate of sales growth will not be initially very high compared to this stage. So, at this stage this is the introductory stage therefore, you can see here that the rise of sales will not be as much as the kind of costs that you have already incurred and the marketing expenses that you will be bearing and the promotion at this stage focuses on awareness and information remember that are we talked about for the adoption rate, etcetera; that means, awareness spreading unless people know about your product or service; obviously, there will be no buying.

So, how all lot of focus will have to be that is why even though in the marketing mix you know we talk about product promotion a place and price that promotion in case of a new product high technology product we often call it customer education; that means, we need to demonstrate as you remember that trialability issue that we had or relative advantage easily demonstrated in therefore, a lot of information spreading sharing will have to have will have to happen with the customers.

So, those who are introductory stage activities and communication, therefore, of the 2 types remember I talked about there are these 2 types of communication the word of

mouth as well as direct from the marketer these will have to be stimulated these will have to be orchestrated for good growth to happen during the introductory stage.

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Then comes the growth stage this is the linear stage your outputs will be proportional to the inputs. So, the increasing rate of sales and; obviously, if the market has caught on and the market is growing just like honey or nectar in the flower it will attract bees. So, more competitors will come into that market.

Then that intense competition will some people will fail and that leads to market consolidation and then initial healthy profits will start coming advertising will become more aggressive because you no want to push out challengers or challengers want to push out the incumbent players the currently entrenched market players. So, aggressiveness in advertising increases at this stage and there were; obviously, it needs wider distribution.

So, again we look at the graph; that means, at this stage in the growth stage there will be intensity of competition more competitors will come in therefore, there will be more rivalry there will be more aggressive advertising happening there will be more distribution needed at this stage more people will start adopting at this stage, we are keeping it simple and we are showing you a continuous graph in the next session, I will show you that actually it is not as that simple there are many things happening within

this within here and particularly important is to look at these junctures and this is where death traps often happen products die successful products die even after launch.

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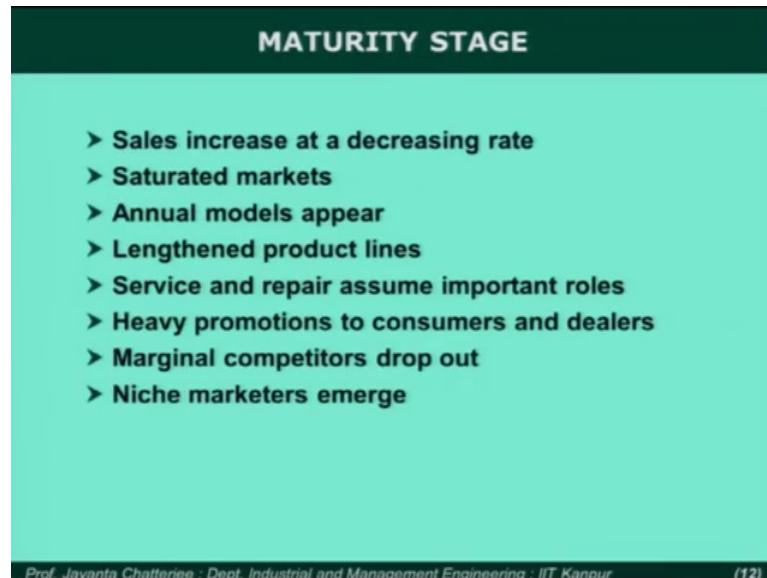
In the maturity stage because we talk about dying or exiting we often say oh maturity stage, but actually you can make a lot of money even at the matured stage because what happens is even though the sales rate declines because the market is saturated not everybody can sustain at that stage only people who have managed their costs very well people who have continuously improved their operational excellence, those are the only people who will survive at this stage and therefore, the product line can be lengthened, you can gain a lot of traction by way of providing superior service at this stage and because the smaller competitors drop out. So, actually per unit profit may go up at this decline stage?

So, again therefore, we cannot ignore this stage particularly if we have managed our operational excellence well at this stage, then this can be a stage where we can harvest and we can therefore, make lot of money at this stage if we have managed our previous stage as well and decline stage you know there will be long run drop in sales.

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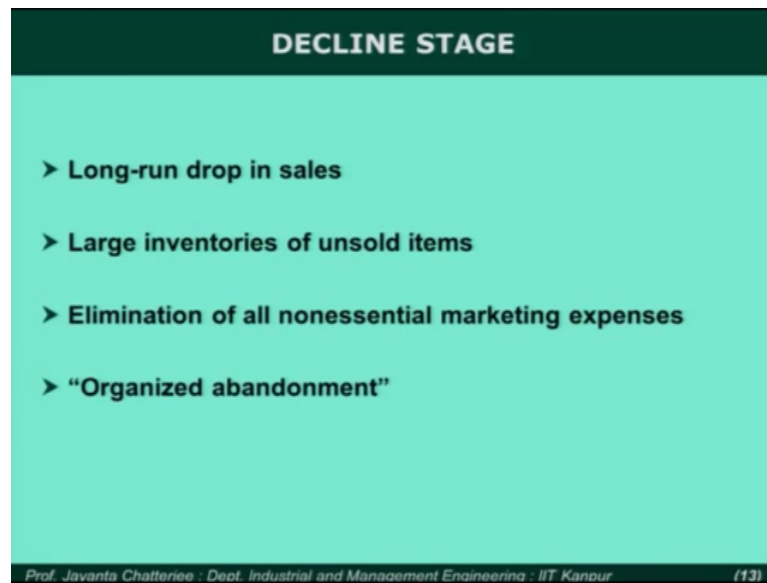
There may be some inventory of unsold items which you may have to pro offer discounts just as you know you get a earlier model at a lower rate of course, some companies manage their inventory so well that they deliberately make the earlier products less attractive. So, that people do not buy those products and we have recently come across this thing that you know scandalous that apple was actually they have admitted that they were throttling from their own system the older phones i-Phones in the market. So, that people were compelled to buy the new models that has been you know widely criticized and legal action and apple has apologized to the market.

But the issue is here that if you have and apple is able to do that because they do not have this lot of unsold inventory, but some companies actually offer. So, apple is actually making it costlier for you to buy the older model and they are making it more attractive to buy the newer model, but in many cases, we see people actually give high discounts for the older models and therefore, you know you need to crear clear this large inventory of unsold items kind of and we know what you say organized abandonment a popular technique also sometimes is that you know a model has run out of its potential in the in a developed market. So, you shift that entire factory in all its, you know dyes and molds and all the machines you move to an underdeveloped market.

So, in India, for example, we have inherited the automobile manufacturing facilities of many countries which became defunct in those countries and those models are now

getting produced in India of course, it may happen as it happened in case of folks wagon beetle that it moved out of Germany and it actually went to Mexico and then there was a worldwide rise in interest and suddenly that factory in Mexico became you know highly productive because lot of people were again wanting to buy that old folks wagon model or like recently has happened in India that the Royal Enfield Bullet which people had set key, it has declined and its gone and then you know very able leadership that we have seen from Mister Lal has regenerated almost a cult following for that product and we see now rise in volume as well as spectacular rise in profit for that old model because it has now become a symbol of macho maldess and people are therefore, buying it like as if for hobby for various other purposes.

So, you can actually therefore, create even from the decline stage a renewed interest. So, sometimes we call it you know like here at this stage you can create a new life that at this stage you can. So, sometimes this graph is called the s curve you know it looks a bit like an s, but sometimes, you can create another flip here as we are seeing in case of the Royal Enfield Bullet and then that is called the e curve. So, from this s curve by clever design our marketing and a combination you can actually create another life cycle and that is called s curve giving way to an e curve.

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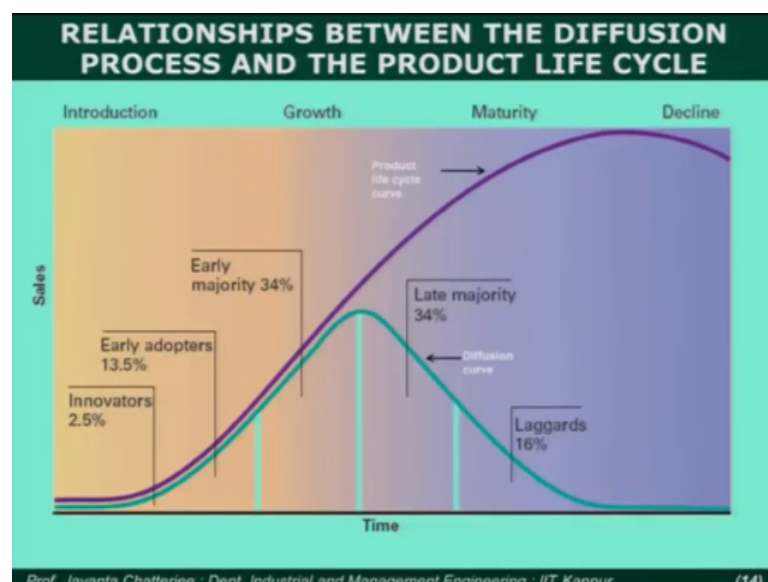
Now, last slide and a very important point is to say that if we assume this bell shaped normal distribution bell shaped normal distribution which greaves leads to this

cumulative growth rate graph which we usually call the product life cycle graph then mathematically we can say that innovators; that means, this part of the graph the area under this graph will be about 2.5 percent of the total area under this graph total area under this graph which represents the total potential sales of a particular product or service or combination this part the innovator part is 2.5 percent.

And similarly we can say early adopters this part is 13.5 percent. Now this 13.5 plus 2.5 which is 16 percent is a very interesting figure which means that if you have conceived a product well and if you have actually done there those 5 criteria of backward compatibility and handling of complexity with simplicity of user interface observable relative advantage trialability all that you have handled well, then you can actually attract some people who are innovators and early adopters, we will see their characteristics and you can have rapid rise and, but your product may die at this stage; that means, if the total market is 100, 1000, say or 1 million say then at 16 percent you may actually collapse. So, this becomes a valley of death at this point of time. So, there are many examples where the products were brilliantly successful to start with, but then they disappeared due to various reasons which we will discuss in the our next session.

Similarly, the early majority can be 34 percent and then of course, late majority actually many products do not go beyond even this 34 percent may not be full covered. So, the issue is therefore, in a way often sometimes people say that for a new product in the high velocity market, today this 16 percent plus 34 percent you should actually plan in terms of 50 percent of the total possible market and you have to do your financial calculations for return on investment and return on asset, etcetera based on that 50 percent because only in exceptional cases, we will be able to go to this other 34 percent plus 16 percent.

So, but as you can see here while here if you are able to somehow catch the late majority it can add a very significant percentage; so, products with a longer possibility of sustaining in the market as I have said not many products have that good fortune, today you can actually make a lot of extra money because at this stage you have more or less written off all your investments you have covered all of that and this is you know pure profit at this stage.

So, this is a good opportunity to good understand the product lifecycle deeper and how to lengthen the product life cycle and the longevity of a product. So, we end our session

here and we will take up in more detail the various aspects of the characteristics of the different types of buyers and how they buy and why they buy and why they do not buy etcetera in a subsequent session.

Thank you.