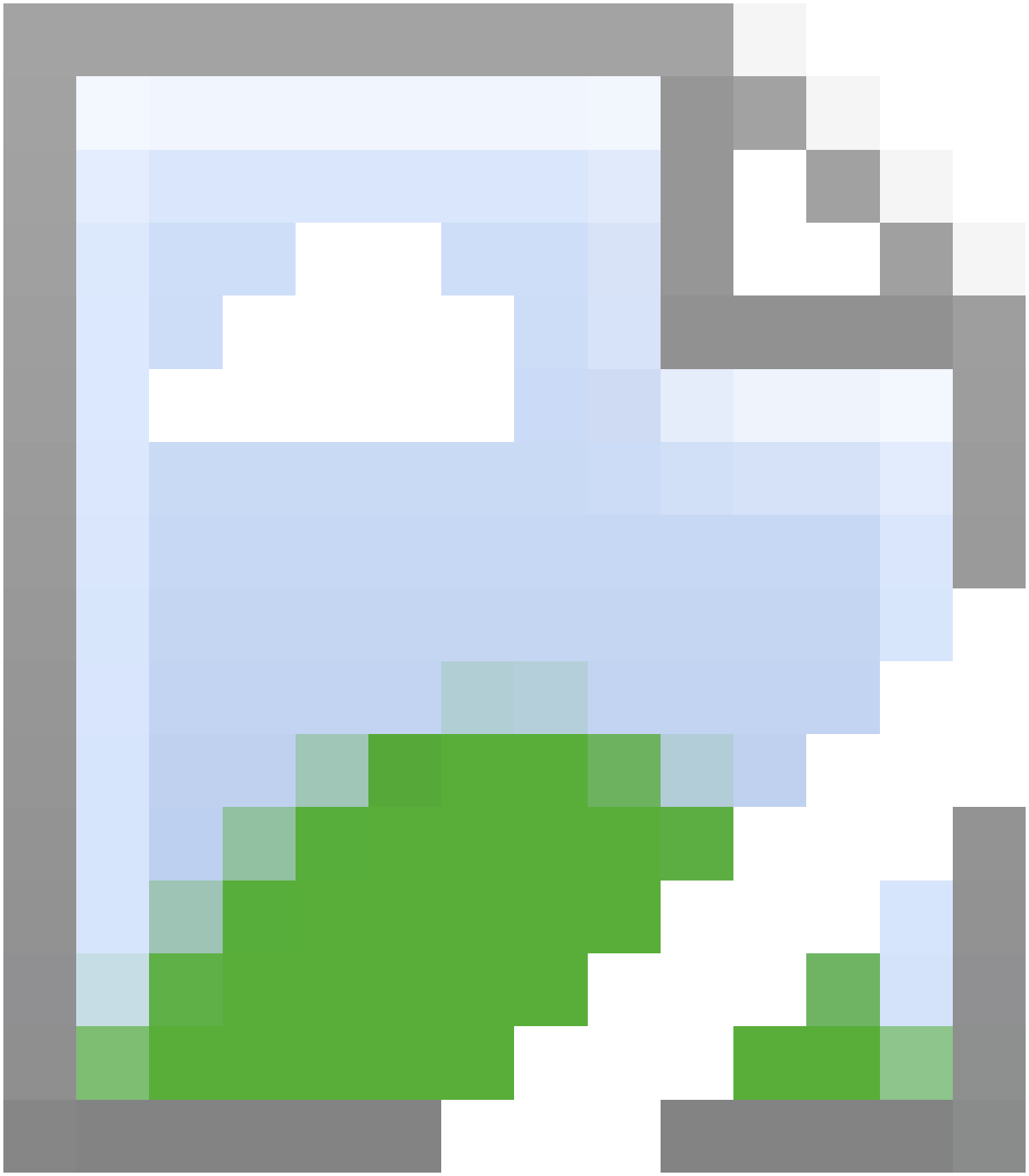
Strategic Innovation: Building and Sustaining Innovative Organizations

Module 2

ILLINOIS
Gies College of Business



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Preface

Thank you for choosing a Gies eBook.

This Gies eBook is based on an extended video lecture transcript made from Module 2 of Professor Geoff Love and Professor Raj Echambadi's *Strategic Innovation: Building and Sustaining Innovative Organizations* on Coursera. The Gies eBook provides a reading experience that covers all of the information in the MOOC videos in a fully accessible format. The Gies eBook can be used with any standards-based e-reading software supporting the ePUB 3.0 format.

Each Gies eBook is broken down by lessons that are navigable using our e-reader's table of contents feature. Within each lesson the following sequence of content will always occur:

- Lesson title
- A link to the web-based videos for each lesson (You must be online to view.)

Within the lesson, every time there is a slide change or a switch to the next informative video scene, you will be presented with:

- Thumbnail image of the current slide or video scene
- Any text present on the slide in the video is recreated below the thumbnail in a searchable, screen reader-ready format.
- Extended text description of the important visuals such as graphs and charts presented in the slides.
- Any tabular data from the video is recreated and properly labeled for screen reader navigation and reading.
- All math equations are presented in MathML that provides both content and presentation if on screen.
- Transcript that captures all of the original speech in the video labeled by the person speaking.

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Module 2 Strategic Innovation: Building and Sustaining Innovative Organizations

Module 2 Information

Introduction to Module 2

Media Player for Video

Life Cycle - Slide 1

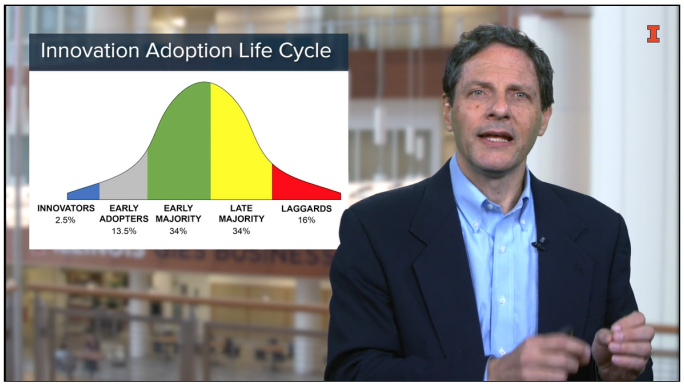
This slide shows Innovation Life Cycle represented by bubbles in a circular format where the bubble eventually grows bigger as the circle moves in a clockwise direction.

Transcript

This second module is about mastering the life cycle of an innovation. We can think of innovation as moving from something new to the world, a baby so to speak, to something well-established and experienced, a mature adult. That is there's a life cycle. The motivation for this whole module is that winning in innovation requires understanding the life cycle in some depth, simply because winning requires different things at different points in that life cycle. So in this video, I'm going to quickly introduce some of the concepts you'll see in Raj's video. And along the way, I'll also ask you some questions you can think about and write down a quick answer to, like I did the first time, to help you get more from the lessons themselves.

So, first, you want to recognize that there are two sides to this life cycle. It's not just single-dimensional.

Innovation Adoption Life Cycle - Slide 2

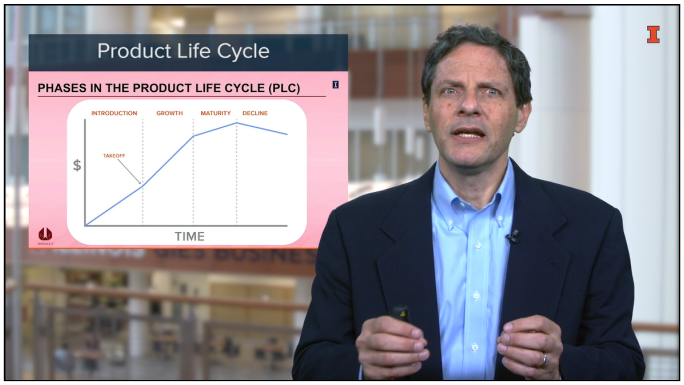


The slide contains Innovation Adoption Life Cycle as a normal distribution or bell shaped curve divided into 5 stages along with area covered by each part in the normal distribution. Following are the stages: Innovators (2.5%), Early Adopters (13.5%), Early Majority (34%), Late Majority (34%), and Laggards (16%).

Transcript

There's a consumer side life cycle, called the Innovation Adoption Life Cycle. The first lesson covered this in two parts.

Product Life Cycle - Slide 3

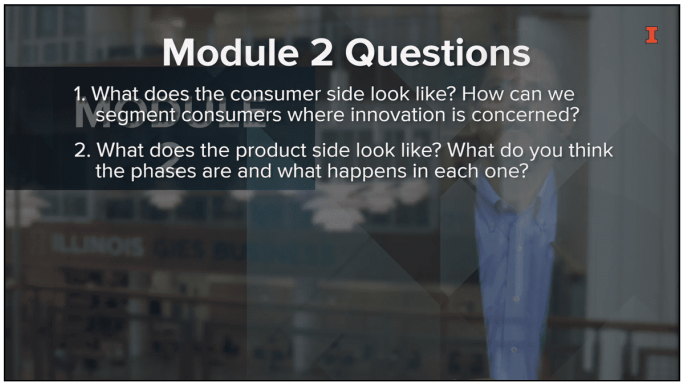


The slide contains a linear graph vertically divided into 4 sections: Introduction, Growth, Maturity, and Decline with Time on x axis and $ on y axis. The graph grows linearly for the first 2 sections Introduction & Growth, increases gradually for the third section Maturity and then starts decreasing gradually in the Decline section. The point where the graph line intersects the Introduction line is labeled as Takeoff

Transcript

Then there's a product side life cycle. This is the second lesson, also in two parts.

Module 2 Questions (Questions 1 and 2) - Slide 4

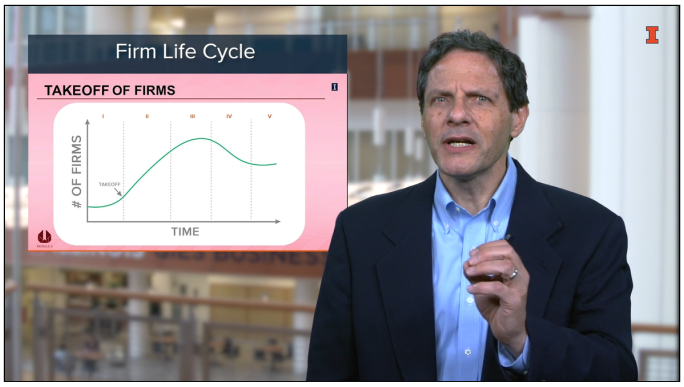


1. What does the consumer side look like? How can we segment consumers where innovation is concerned?
2. What does the product side look like? What do you think the phases are and what happens in each one?

Transcript

So my question for you to think about, what does that consumer side look like? And the hint is, how can we segment consumers where innovation is concerned? The second question, what do you think that product side looks like? What do you think the phases are, and what happens in each one in the product side life cycle?

Firm Life Cycle - Slide 5



The slide contains a curved line graph with number of firms on y-axis and time on the x-axis which depicts the rate of firm takeoffs. The graph is split up in 5 segments (left to right) to represent each phase of the firm life cycle. The curved line begins at a low point in segment I and continues to move upwards until it reaches its peak at the third segment. The curved line continues to decrease when moving into the fourth segment, but normalizes at a horizontal trend in its final segment. This graphical representation of a curved line generally shows when firms are both entering and leaving the market. A key concept is that firm takeoff occurs at the end of segment I, moving into II at the inflection point. Market fluctuation or maturation ultimately affects the number of firms over time.

Transcript

Now, actually, there's a little more. There is also what Raj calls a firm life cycle. And this might be a little less intuitive, a firm life cycle. What it is, it's about when firms are entering the market and when they're leaving the market. And it's analogous to when customers are entering the market or leaving. Firms might dive in early but then get forced out as the market matures.

Customer, Product, and Firms Triangle - Slide 6

The slide contains a triangle with Product (Tech), Firms (Competition), and Customer (Demand) represented on each side of the triangle in clockwise direction.

Transcript

So really, you want to think of a triangle. The product technology side, the customer demand side, and the firm side (the competition). This triangle, each element is competing - sorry, they're coupled, they affect one another, but they are not the same. Keep that in mind. So now we move on a little bit, and let me ask you: How do you know an innovation is going to be successful, is the question.

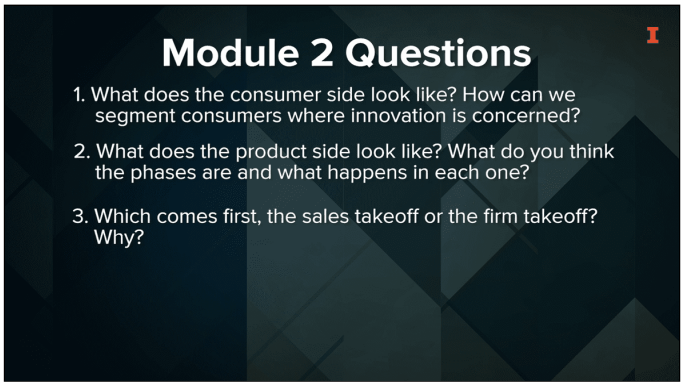
Innovation Take-off Point - Slide 7

The slide contains Innovation Take-off point represented by an upward moving S shaped arrow.

Transcript

And you might think, well, it's when things take off, like this. It's going like this and then there's an elbow and it goes up. The point is that this takeoff point is really critical. And what you'll learn though is that there's two important takeoff points for an innovation. There's the sales takeoff, when sales show that elbow. And there's a firm takeoff, when the number of firms show that elbow.

Module 2 Questions (Question 3) - Slide 8



1. What does the consumer side look like? How can we segment consumers where innovation is concerned?
2. What does the product side look like? What do you think the phases are and what happens in each one?
3. **Which comes first, the sales takeoff or the firm takeoff? Why?**

Transcript

So here's my question for you about this: Which do you think comes first, the sales takeoff or the firm takeoff? And why? Takeoff points have a really important implication. They're a big part of the answer to the really key question of when it is best to enter an innovations market. And now for when I think of the money question. Well, how do we win through the life cycle? That is, how do we compete successfully? What do we need to do to win? And how does this change across the life cycle?

Life Cycles - Slide 9

The slide contains an image showing that the Product/Technology and Customer/Demand are connected to each other.

Transcript

Now, you'll see that the answer here comes from this big idea that there is a product or technology side and a customer or demand-side to this life cycle. And it's in the relationship between these that the answer to that question of, what do we need to do win and how does this change across the life cycle. That's where the answer comes from.

So okay, after that lesson, the module's going to close with a discussion of different types of innovations and when in the life cycle each is most important and then a case study in the personal computer market in its evolution where you can see all these concepts come together in a very concrete way. I think you'll see this is really exciting stuff. And I'll see you at the end.

Lesson 2-1 Innovation Adoption Lifecycle

Lesson 2-1.1 Innovation Adoption Lifecycle

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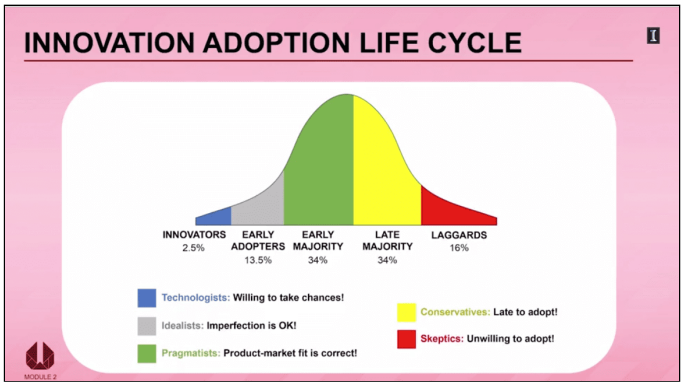
Innovation Adoption Lifecycle - Slide 10



The slide contains the same information as Slide 2 Innovation Adoption Life Cycle

Technologists: Willing to take the chances!

Idealists: Imperfection is OK!

Pragmatists: Product-market fit is correct!

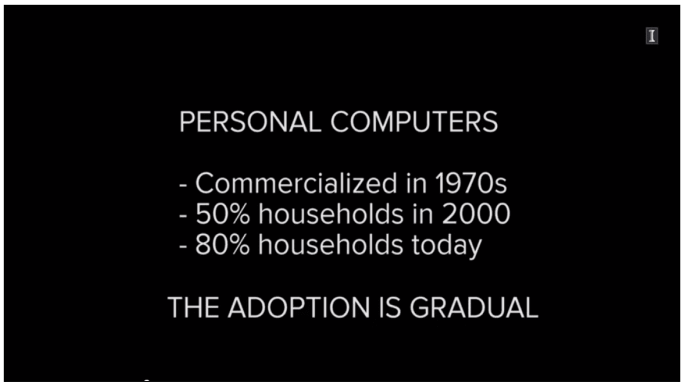
Conservatives: Late to adopt!

Skeptics: Unwilling to adopt!

Transcript

When an innovation is adopted, not all consumers adopt at the same time. Some adopt early. Some adopt late. Some never adopt at all. And a useful model to classify the various adopters based on their readiness to accept new innovations is known as the innovation adoption life cycle. It is a bell curve with five categories. To set it in context, think of the personal computers. Personal computers were commercialized in the 1970s.

Personal Computers - Slide 11



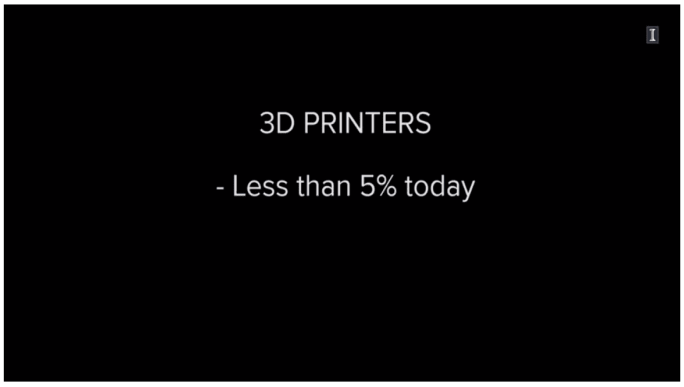
- Commercialized in 1970s
- 50% households in 2000
- 80% households today

The Adoption is Gradual

Transcript

The percentage of homes with personal computers was about 50% in the year 2000, and it is about 80% today. So the adoption is gradual.

3D Printers - Slide 12

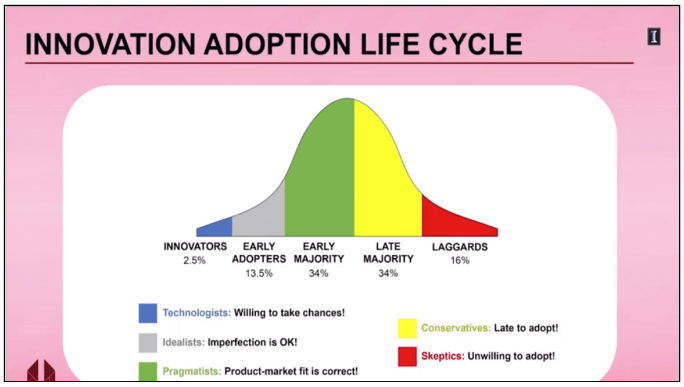


-Less than 5% today

Transcript

The percentage of homes with a 3-D printer today is about less than 5% in the United States.

Innovation Adoption Life Cycle - Slide 13



The slide contains the same information as Slide 2 Innovation Adoption Life Cycle

Transcript

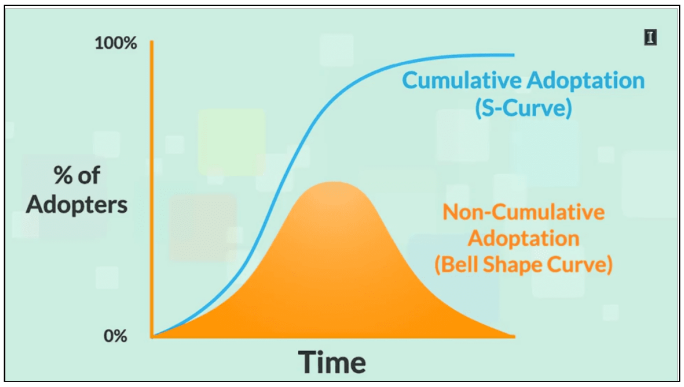
So the consumer adoption life cycle classifies adopters based on their readiness to accept new innovations over time. And it accurately describes how a technology is adopted by a set of consumers, by a community or society. So what are the various groups? The various groups are innovators at 2.5 % who are willing to take chances. The early adopters at 13.5% who are actually idealists, who are okay with imperfect products. The early majority at 34% for whom the product has to be perfect. In other words, in innovation terms, the product market fit must be highly appropriate. Then you have 34% late majority who are usually late to adopt and wait till the majority of the market has adopted. And last but not the least, are the skeptics at 16% who are unwilling to adopt. Think of the people who still use typewriters today for word processing instead of using computers. These are likely to be the laggards today. So as you can see from the adoption curve, each category has certain characteristics. But the most important thing is that all these innovations go through a predictable process before becoming widely adopted. So an understanding of the innovation adoption life cycle helps us to develop appropriate strategies.

Professor Raj Echambadi - Slide 14

Transcript

How do we know that a product has not failed and fallen into the chasm but actually transitioned to being successful? We look at the industry level figures and we see if there is a tipping point or a takeoff point or, in layman's terms, an elbow. When that happens, it usually tells you that the industry is becoming viable with a lot of opportunities for companies to become mass-market companies.

Cumulative and Non-Cumulative Curves - Slide 15

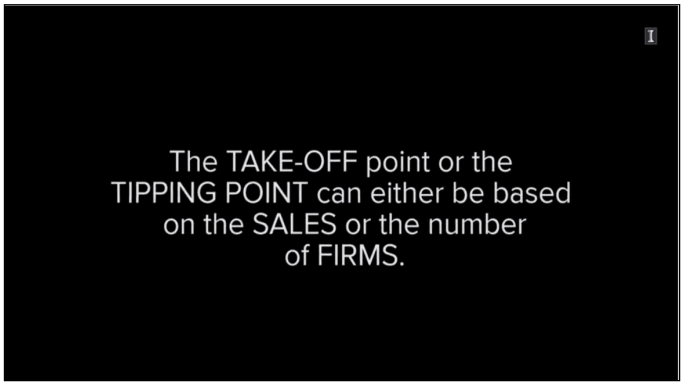


The slide contains a graphic overlay of the bell shaped curve of Non-Cumulated Adaptation and S-Curve of the Cumulative Adaptation. In this graph, % of adopters is on the y-axis, while time is located on the X-axis. This graph shows the point in which adoption transitions from the Early Majority to Early Adopter phase which occurs at the inflection point (j-shape) in the left side of the graph. The takeoff point is a key concept both at the point in which occurs and that it occurs in the same time period for both consumer and firms alike.

Transcript

To understand the takeoff point, we need to understand the noncumulative bell shaped curve that talks about the various categories of adopters. But this noncumulative bell shaped curve can be plotted as a cumulative distribution. What does that mean? We know that the noncumulative bell shaped curve has various categories: 2.5% innovators; 13.5% early adopters; 34% early majority. Instead of stacking them side-by-side, if you stack them one on top of each other, then you get the cumulative curve. Now let's compare the cumulative S-curve with the noncumulative bell shaped curve, and you'll find that in the point where it transitions from the early majority to the early adopter category, you'll have what we call as a takeoff point. A hockey-stick pattern or a J-shaped point which Malcolm Gladwell calls is the tipping point. But there is a larger point that I want to make here, which is that innovation adoption is never linear.

The Take-Off Point - Slide 16



The **Take-off** point or the **Tipping point** can either be based on the **Sales** or the number of **Firms.**

Transcript

The takeoff point or the tipping point can either be based on the sales or the number of firms.

Sales and Firms Take-Off - Slide 17

If it's based on **Sales**, we call it the ***Sales Take-off point***. If its's based on the number of **Firms**, we call it the ***Firm takeoff.***

Transcript

If it is based on sales, we call it the sales takeoff point. If it is based on the number of firms, we call it the firm takeoff.

Lesson 2-2 Will the "New-to-the-World" Innovation Fly? A Discussion of Sales Takeoff and Firm Takeoff Points

Lesson 2-2.1 Will the "New-to-the-World" Innovation Fly? A Discussion of Sales Takeoff and Firm Takeoff Points - Part 1

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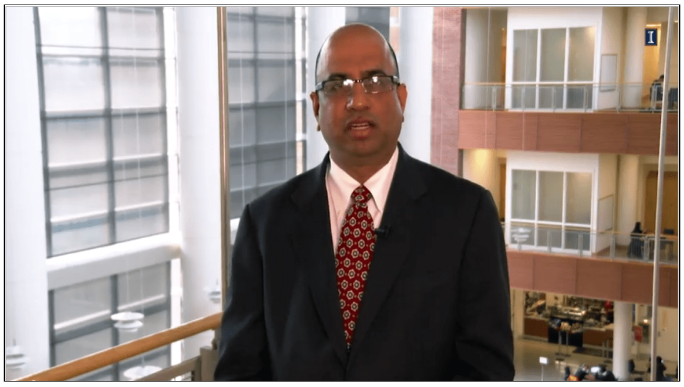
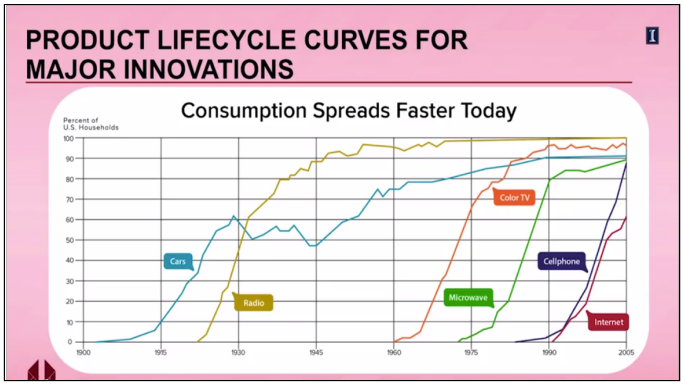
Professor Raj Echambadi - Slide 18



Transcript

We'll examine a new-to-the-world innovation and look at the evolution of firm sales over time, which we call the product life cycle.

Product Lifecycle Curves for Major Innovations - Slide 19



The slide contains a line-graph titled Product Lifecycle curves for Major Innovations. The X-axis represents the timeline from 1900 to 2005 and the Y-axis represents the percentage of US households consuming a certain innovation. The individual graph-lines are for Cars, Radio, Microwave, Color TV, Cellphone, and Internet.

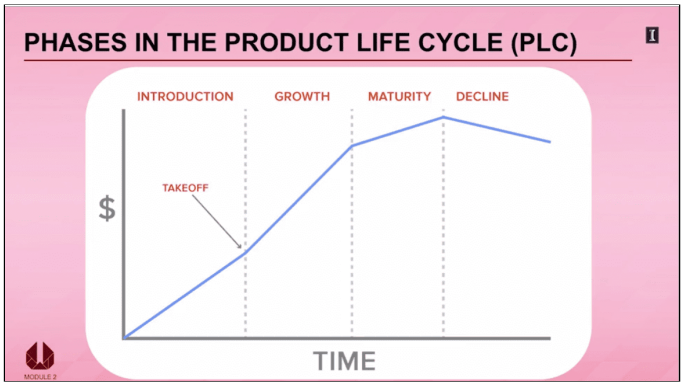
Cars were introduced in early 1900s and it took 60 years for a 70% market adoption rate. Radios were introduced in 1920s and took 20 years for mass adoption. Color TVs were introduced in 1960 and it took 15 years for a 70% adoption rate. Microwaves were introduced in 1972 and it took 15 years for a 70% adoption rate while the cellphone took less than 10 years for a mass market adoption of more than 70% of households. The conclusion is that mass market adoption of innovation spreads faster today than it did in the early 19th century and the adoption rates of disruptive innovation has increased exponentially.

Transcript

Let's look at the product life cycle curves for some of the major innovations in the last century. The X-axis is time, and the y-axis happens to be the percentage of households, which is a proxy for sales. So the curve that you see is the product life cycle. Think about the autos. Launched in the early 1900s, you can see a very sharp elbow point at around 1915, and we call that the sales takeoff because the takeoff, or the tipping point, is based on sales.

Think about radios. Launched in the 1920s, has a fairly quick sales takeoff. Color TVs launched around 1960. Initially flat. Then explodes in the marketplace. Very similar curves are seen for microwaves and cell phones, but the interesting part is about the Internet. The Internet curve is actually linear. It is the fastest diffusion that we have seen in the last 100 years or so. And one important thing that I want to emphasize is the Internet diffusion is actually exception to the norm. Most diffusions, when you smooth it out, happens to be an S curve.

Phases in the Product Life Cycle (PLC) - Slide 20



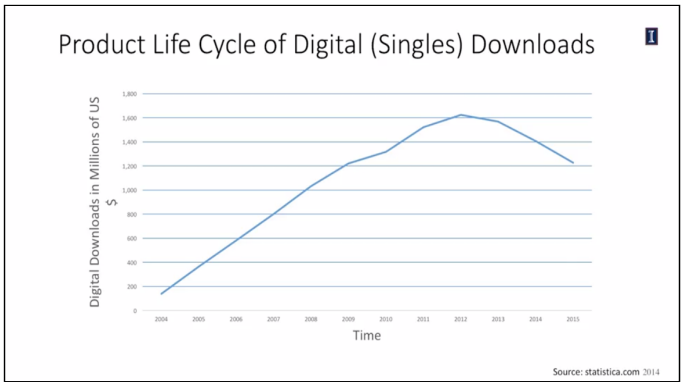
The slide contains the same information as Slide 3 Product Life Cycle

Transcript

Now let me explain the product life cycle. On the X-axis is time. On the y-axis we have sales. And when we plot sales either in terms of units or in terms of dollars or in terms of the currency, we find four distinct stages as we go through time. We have the introductory stage, where the sales are usually low, and then you have the growth stage, where there is an explosion of sales. That leads to the maturity phase, where sales start plateauing, and then, of course, the decline sales, where the net sales actually start falling. There is a fundamental difference between the growth stage and the mature stage. The growth stage — as you can see, the slope is very steep, and it is increasing at increasing rates, whereas the slope for the maturity phase is increasing at decreasing rates.

Let's take a couple of examples to illustrate the product life cycle. Take the case of color TVs. It is in the mature phase in the developed world. Most households have multiple TVs, whereas color TVs are in the growth phase or early maturity phase in most of the emerging markets. Take the case of typewriters. It is in the decline phase. Most people that need to word process are using computers instead of typewriters. One very interesting thing is that the product life cycle that we see here has significant parallels with the adoption curve such that you can see that the innovators and the early adopters are more likely in the introductory phase, and the early majority is likely to be found in the growth phase, if you will. So at a broader level, there is a correlation between the product life cycle that you see here and the consumer life cycle that you've studied.

Product Life Cycle of Digital (Singles) Downloads - Slide 21

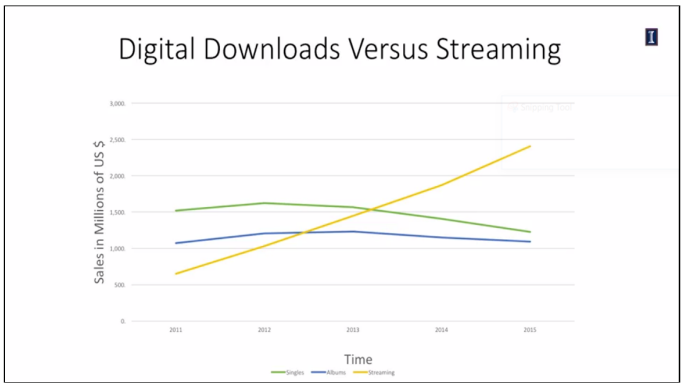


The slide contains a line graph with Time (2004 to 2015) on X-axis and Digital Downloads in Millions of USD (0 to 1,800) on Y-axis. The line graph increases linearly from around 150 in 2004 to about 1,600 in 2011 and then decreases gradually and reaches 1,200 in 2015.

Transcript

Another example of how the PLC is used in the real world can be illustrated with this example of the product life cycle of digital downloads. What you have on the screen are the digital downloads of singles over time. Digital downloads are usually accomplished using websites like iTunes. And you can see the evolution seems to imply a drastic slope from 2004 to 2012 and after which there is a sudden decrease in the number of digital downloads as far as singles are concerned

Digital Downloads Versus Streaming - Slide 22

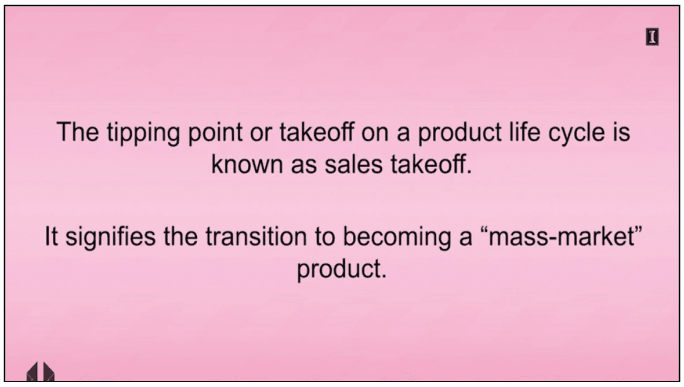


The slide contains a line graph titled Digital Downloads Versus Streaming. Time is plotted on the X-axis from 2011 to 2015 and Sales in Millions of US Dollars ranging from 0 to 2500 Million on Y-axis. The comparison is between the sales of single songs vs albums vs streaming from 2010 to 2015. The Sales of single songs was 1500 Million USD in 2011, rose to 1600 Million in 2012, and then gradually declined to 1200 Million in 2015. The music album sales were at 1000 Million USD in 2010, rose slightly to 1200 Million USD in 2012, and then gradually declined back to 1050 Million in 2015. Streaming sales during this period started at 550 Million USD in 2012, and then steadily increased to 2450 Million USD in 2015. Thus, streaming sales overshot the other categories in 2013 and is now generating more sales ($2400 Million) than singles ($1100M) and album sales ($1100 M) combined.

Transcript

Now, look at this slide, where you can see that the downloads of singles and downloads of albums are reasonably correlated, except that the digital downloads of albums is a much smaller number than the digital download of singles. But, on the other hand, look at the streaming numbers. The streaming numbers are linear. In fact, the streaming numbers are much, much, much higher than the digital downloads of either singles or albums, which effectively means if you are a site like iTunes, you are wondering whether there is future in the digital download business. This possibly could explain why Apple went ahead and bought the streaming music site Beats for $3 billion.

Sales Take-Off - Slide 23



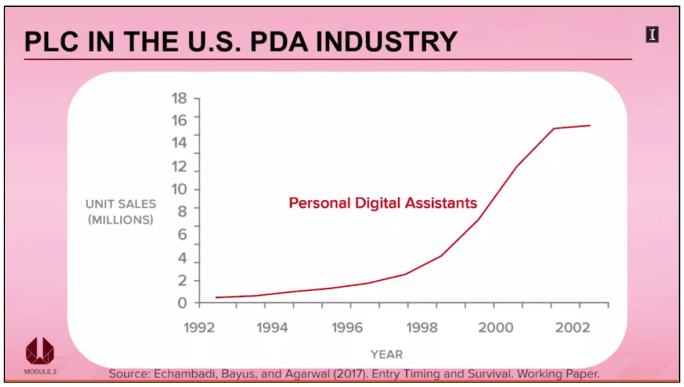
The tipping point or takeoff on a product life cycle is known as sales takeoff.

It signifies the transition to becoming a "mass-market" product.

Transcript

The takeoff point on the product life cycle is known as the sales takeoff. It actually signifies the transition when a niche product turns into a popular mass-market product wherein a significant portion of the population becomes interested in the category.

PLC in the U.S. PDA Industry - Slide 24

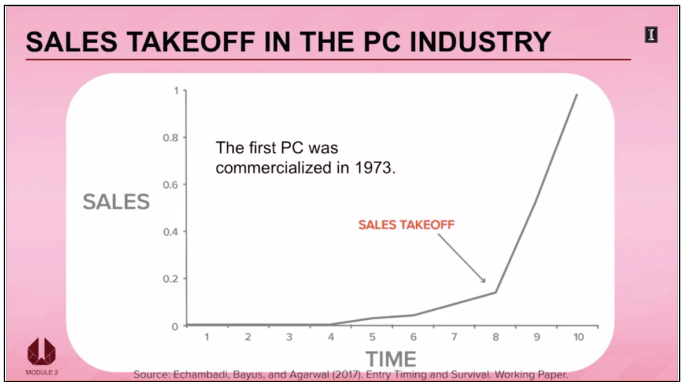


The slide contains a line graph of Personal Digital Assistants with Year (1992–2002) on X-axis and Unit Sales (in Millions) on Y-axis. The line graph increases exponentially from around 0 Million in 1992 to 16 Million in 2001 and becomes a flat line till 2002.

Transcript

Let's take the product life cycle in the personal digital assistant industry in the United States. When you plot the sales over time, you see an elbow that happens after 1998, and it looks like between 1999 and 2000 is when the sales takeoff happened.

Sales Takeoff in the PC Industry - Slide 25



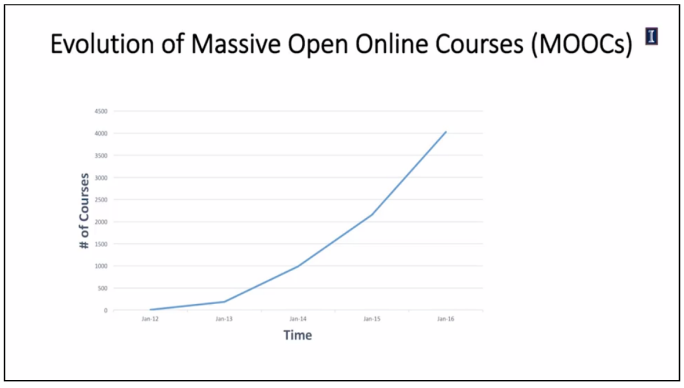
The slide contains a Sale Takeoff line graph with Time (0 to 10 years) on X-axis and Sales (0 to 1 on Y-axis). The line graph shows a horizontal trend coinciding with X-axis till 4th year, increases gradually till 8th year and then increases almost vertically till 10th year and reaches the max point on Sales axis.

The first PC was commercialized in 1973

Transcript

Let's take an example of the product life cycle and the personal computer industry in the United States. You can see the sales takeoff seems to have happened after year eight. There are three fundamental points I want to make here. One, product life cycle curves are not usually linear. Second, the takeoff point is not instantaneous. It took at least eight years for the personal computer industry to incubate and then successfully take off, which leads me to the third point, which is managers need to have patience. They should not pull resources off the product, and they should start learning to manage in years and not in quarters when you're talking about a radical innovation.

Evolution of Massive Open Online Courses (MOOCs) - Slide 26



The slide contains Evolution of MOOCs as a line graph with Time (12th Jan to 16th Jan) on X-axis and # of courses (0 to 4500) on Y-axis. The line graph increases gradually from 12th Jan and reaches 50 courses on 13th Jan. It then increases almost linearly and reaches 4000 courses on 16th Jan.

Transcript

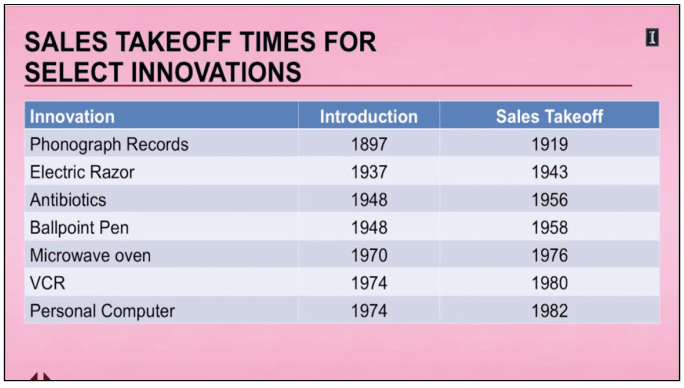
Now that we have discussed the product life cycle, here is an illustration of how the concept of product life cycle can be used in order to develop innovative products. On the screen you have the evolution of massive open online courses, or MOOCs, over time. MOOCs were commercialized in 2011, and as you think about the evolution, you see a significant takeoff point in January 2013. So when we had to make a decision about our online MBA, which we call as the iMBA, and whether to integrate it with MOOCs, we looked at this curve. And based on the sales takeoff, which effectively implied that the transition into the mass market was happening, we were reasonably sure that MOOCs were going to be popular, they were going to diffuse into the mass market, and it made eminent sense for us to launch our MOOC-based online MBA program.

Professor Raj Echambadi - Slide 27

Transcript

The elbow, or tipping point, on a product life cycle, which is basically modeling industry sales over time, is actually known as the sales takeoff point. It actually signifies a major milestone in the life cycle of an industry because it signifies the transition of the industry from catering to niche segments to a mass market with broad innovation opportunities.

Sales Takeoff Times for Select Innovations - Slide 28



Innovation	Introduction	Sales Takeoff
Phonograph Records	1897	1919
Electric Razor	1937	1943
Antibiotics	1948	1956
Ballpoint Pen	1948	1958
Microwave oven	1970	1976
VCR	1974	1980
Personal Computer	1974	1982

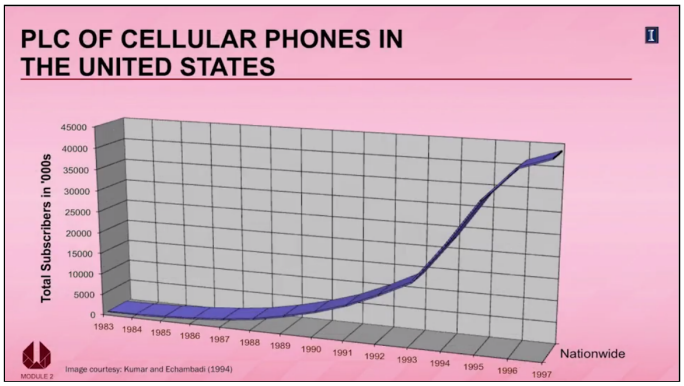
Sales Takeoff Times for Select Innovations - Slide 28

Innovation	Introduction	Sales Takeoff
Phonograph Records	1897	1919
Electric Razor	1937	1943
Antibiotics	1848	1956
Ballpoint Pen	1948	1958
Microwave oven	1970	1976
VCR	1974	1980
Personal Computer	1974	1982

Transcript

Let's look at the sales takeoff times for select innovations. Think about the phonograph records. They were commercialized in 1897, but sales takeoff happened 22 years later. Look at antibiotics. Commercialized in 1948 with a sales takeoff in 1956. And as you go down the categories, you can see that almost all of these categories have had significant time difference between the commercialization and the sales takeoff, which implies that the S curve seems to be the norm.

PLC of Cellular phones in the United States - Slide 29

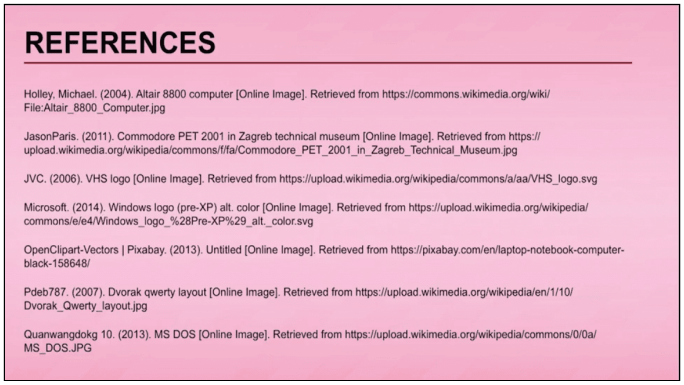


The slide contains a 3d line graph of PLC of Cellular phones in the United States with Year (1983 to 1997) on X-axis and Total subscribers in thousands (0 to 45000) on Y-axis. The line graph coincides with the X-axis till 1986. Later, it increases gradually and reaches around 15000 subscribers in 1993. It increases linearly till 1996 and reaches around 40000 subscribers which later represents almost a horizontal trend in 1997.

Transcript

When you do the product sales of cell phones over time in the United States, you can see that the sales takeoff seems to have happened after 1993. But an interesting point about this is there's another inflection point around 1996, which signifies the transition from the growth phase to the maturity phase.

References - Slide 30



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Transcript

No instruction provided during this slide.

Lesson 2-2.2 Will the "New-to-the-World" Innovation Fly? A Discussion of Sales Takeoff and Firm Takeoff Points - Part 2

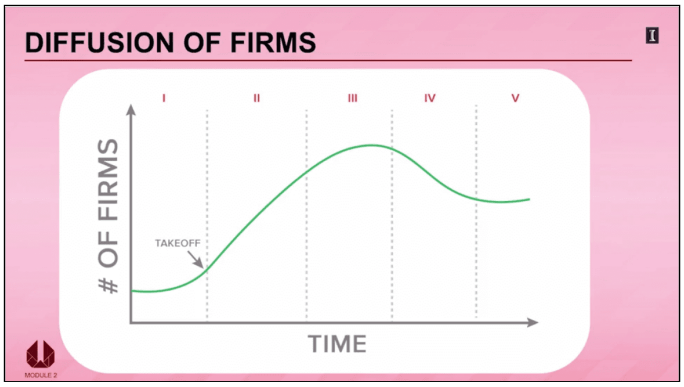
Media Player for Video

Professor Raj Echambadi - Slide 31

Transcript

Now let's look at the firms life cycle. It is modeling the number of firms over time. All firms that entered into a particular industry over time is known as the firm life cycle.

Diffusion of Firms - Slide 32



The slide contains the same information as Slide 5 Firm Life Cycle

Transcript

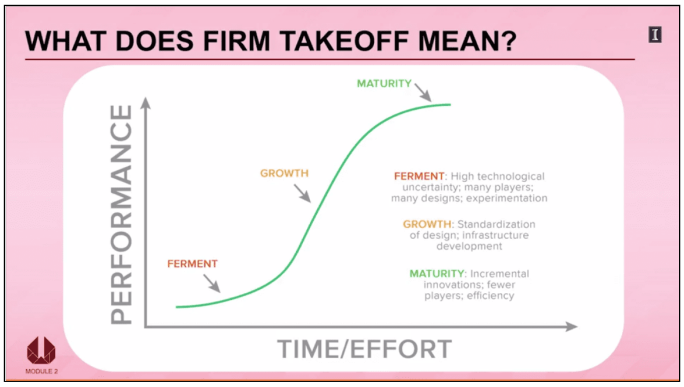
When you plot the number of firms over time, you get a curve that is very similar to the product life cycle. Here we have the curve with five different categories. Stage one is where the commercial introduction of the innovator happens. Stage two, as you can see, there is a sharp increase in the number of firms. Stage three, there is a plateauing of the curve, which signifies that the number of new entrants is equal to the number of existing firms. Then we move on to stage four, where firms drop in significant numbers. This, by the way, is known as shakeout in the popular press, where there is negative net entry. And in stage five, there is a significant decline and the industry basically peters off. What is interesting is between stages one and two, where you can see an elbow or a transition point where there is a change in slope. This point is known as the firm takeoff, and it signifies the explosion in the number of firms.

Professor Raj Echambadi - Slide 33

Transcript

The tipping point, takeoff, or the elbow on the firm life cycle is what we call as the firm takeoff. It actually signifies a major milestone in the industry life cycle, because it tells viewers or observers that the industry is actually transitioning from one of technological uncertainty to an industry that is going to become viable. And usually after the firm takeoff, we see the building up of market infrastructure.

What does Firm Takeoff Mean? - Slide 34



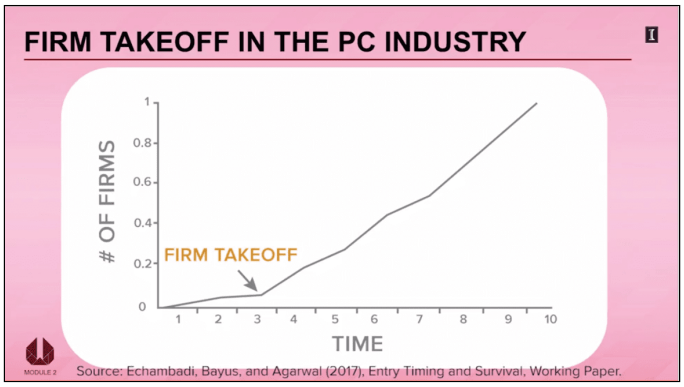
The slide contains a line graph of what does Firm Takeoff mean with Time/Effort on the horizontal axis and Performance on the vertical axis. The line forms a sinusoidal S curve on the graph with three points are labeled on the curve at three different positions. At the bottom of the S curve, ***Ferment:*** High technological uncertainty; many players; many designs; experimentation. In the center of the S curve, ***Growth:*** Standardization of design; infrastructure development. At the top of the S Curve, ***Maturity:*** Incremental innovations; fewer players; efficiency.

Transcript

So what does firm takeoff mean? We can actually exemplify the firm takeoff with the S-curve that was devised by Richard Foster in the mid-'80s. You have on the X-axis time or effort, and on the y-axis, the performance on the major attribute. You can see that when a new to the world innovation comes to the market, there are many players, many designs, there is very high technological uncertainty. In fact, early products are likely to be highly primitive, such that all these players engage in a lot of experimentation. At some point in time, you see the elbow or the takeoff point in the number of firms, which actually indicates opportunities for infrastructure development. And once this happens, it actually becomes the pathway to the standardization of design, also known as dominant design.

So once the standardization of the design happens, over time industries transition to a maturity phase, where the focus is on incremental innovations. There are fewer players because of the shakeout, and more importantly, the industry transition from one of innovation to one of efficiency.

Firm Takeoff in the PC Industry - Slide 35



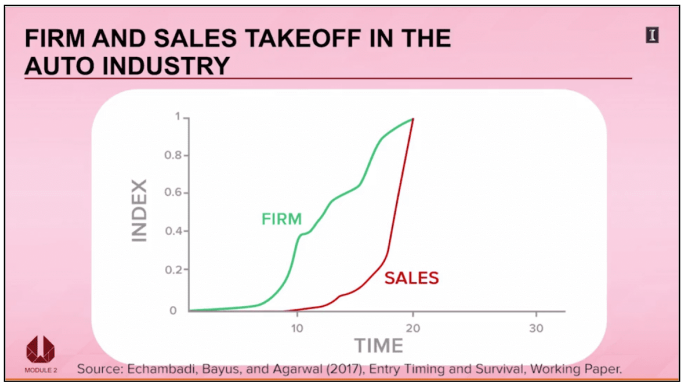
The slide contains a line graph of Firm Takeoff in the PC Industry with Time on the horizontal axis from 1 through 10 and Number of firms on the vertical axis from 0 to 1 in .2 increments. The line graph starts at the bottom left and curves sharply up to the top right. An elbow in the line around Time mark 3 is labeled Firm Takeoff.

Source: Echambadi, Bayus, and Agarwal (2017), Entry Timing and Survival, Working Paper.

Transcript

Let's examine the firm takeoff in the personal computer industry. The personal computer industry today is about 40 years old. And here is a snapshot of the first 10 years. And you can see that the firm takeoff, the first difference in a significant slope, seems to have happened after year three. When we put the sales and firm curves together, we get this visual. And you can actually see that the firm takeoff has happened much before the sales takeoff in the personal computer industry. Firm takeoff seems to have happened after year three, and sales takeoff seems to have happened after year eight.

Firm and Sales Takeoff in the Auto Industry - Slide 36



The slide contains line graphs for sales and firms Takeoff curves in the Auto industry with Time on the horizontal axis from 0 through 30 and Index on the vertical axis from 0 to 1 in .2 increments. A green line graph labeled Firm starts at the bottom left increases gradually and then starts showing a linear increase. A red line graph labeled Sales starts from time 10 first increases exponentially and then almost vertically and meets Firm line at time 20 and index 1.

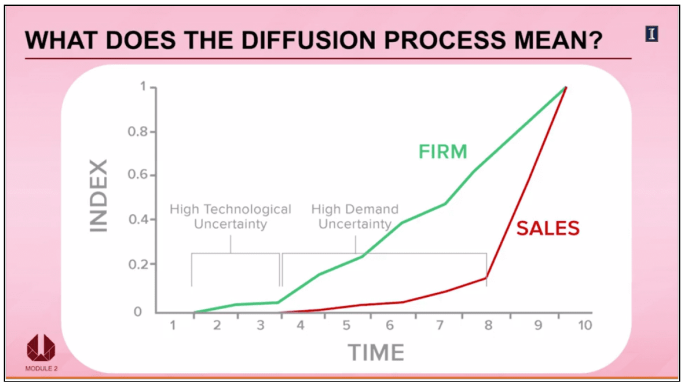
The starting portion where the Firm line starts increasing linearly and the Sales line just starts is labeled as High Technological Uncertainity

The portion where the Sales line starts till it shows a gradual increase is labeled as High Demand Uncertainity

Transcript

We can see the same pattern of firm takeoff preceding sales takeoff in the auto industry as well. Firm takeoff seems to have happened 10 years after commercialization, whereas sales takeoff seems to have happened around year 20 in the automobile industry in the United States.

What does the Diffusion Process Mean? - Slide 37



The slide contains line graphs for sales and firms curves together with Time on the horizontal axis from 1 through 10 and Index on the vertical axis from 0 to 1 in .2 increments. A green line graph labeled Firm starts at the bottom left and shows almost a linear

trend sharply up to the top right. A red line graph labeled Sales starts at the bottom left increases gradually till time 8 and curves sharply up and meets Firm line at time 9 and index 1.

The starting portion where the Firm line starts increasing linearly and the Sales line just starts is labeled as "High Technological Uncertainity" and the portion from where the Sales line starts to the point where the sales line curves sharply is labeled as "High Demand Uncertainity"

Transcript

Now let's generalize what we have studied so far when we put the firm takeoff and the sales takeoff together. Before the firm takeoff, the industry is usually marked by high technological uncertainty. Most products are primitive. But new entrants bring in crucial information and quality improvements. But entrants come in in anticipation of future profits. And with this increase in the number of firms, firm takeoff happens. And between the firm takeoff and sales takeoff, the industry's marked by high demand uncertainty. You don't know if consumers are going to adopt your product. Therefore, there is significant market infrastructure development that happens — advertising, promotion, distribution, and supply chain infrastructure — has to be developed before the sales takeoff. But more importantly, complementary products have to be developed. Let me give you an example. If you are an automotive company in the early 1900s, while you have a good car, you also need to have the associated roads and gas stations for the autos to get defused. In a similar vein, right now if you are Tesla, you need to have a network of electric charging stations right across the country for Tesla to actually defuse and be successful.

Entrants need to learn from each other and build on each other to build a viable product in order to achieve the sales takeoff and become a mass-market product. As a result, competition is not an important construct. Collaboration is.

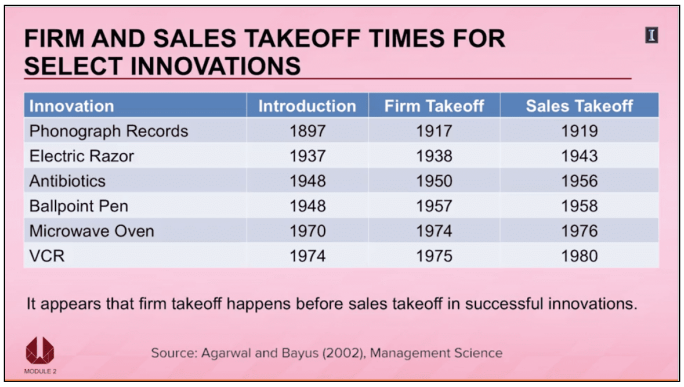
Collaboration - Slide 38

Collaboration is highly critical in the early evolution of any industry.

Transcript

Because legitimacy of the industry is fairly important for the sales takeoff to happen.

Firm and Sales Takeoff Times for Select Innovations - Slide 39



FIRM AND SALES TAKEOFF TIMES FOR SELECT INNOVATIONS

Innovation	Introduction	Firm Takeoff	Sales Takeoff
Phonograph Records	1897	1917	1919
Electric Razor	1937	1938	1943
Antibiotics	1948	1950	1956
Ballpoint Pen	1948	1957	1958
Microwave Oven	1970	1974	1976
VCR	1974	1975	1980

It appears that firm takeoff happens before sales takeoff in successful innovations.

Source: Agarwal and Bayus (2002), Management Science

Sales Takeoff Times for Select Innovations - Slide 39

Innovation	Introduction	Firm Takeoff	Sales Takeoff
Phonograph Records	1897	1917	1919
Electric Razor	1937	1938	1943
Antibiotics	1848	1950	1956
Ballpoint Pen	1948	1957	1958
Microwave oven	1970	1974	1976
VCR	1974	1975	1980

It appears that firm takeoff happens before sales takeoff in successful innovations.

Source: Agarwal and Bayus (2002) Management Science

Transcript

We studied 22 innovations over the past century, and here is a list of the firm and sales takeoff times for select innovations. Look at the phonograph records. Commercialized in 1897. Firm takeoff in 1917. And sales takeoff in 1919. And the same pattern seems to have replicated across, where the firm takeoff precedes sales takeoff. But more importantly, there is a time lag between commercialization and firm takeoff and a time lag between the firm takeoff and sales takeoff. But it is very important that firm takeoff happens before sales takeoff for an innovation to be successful.

Professor Raj Echambadi - Slide 40

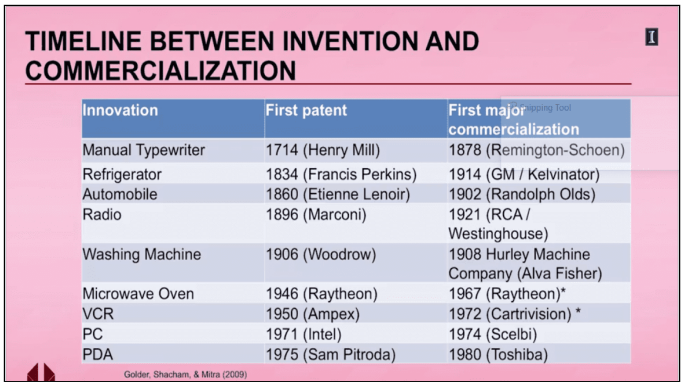
Transcript

Given the long lead time between investment and commercialization, there are three major implications for inventors. The first implication is adopt a long-term perspective. Patience is actually a virtual. But more importantly, beyond commercialization — which is an important goal — there are other possible exit opportunities as well. You could think about being acquired or potentially you could license your technology to other people. These are all favorable outcomes for an innovator.

The second point I want to make is, most innovations actually borrow from previous innovations in three significant ways. Either through a core technology. When you think about a personal computer using the microprocessor from Intel, the core technology came from the outside. They could adopt the functionality of a previous innovation. When you think about a cell phone and a landline, basically they are very different innovations but do exactly the same thing: communicate with people. Or adopt a common look and feel of the previous innovation. So when you think about a computer keyboard, that was very similar to a manual typewriter. Or when you think about the first innovation of the electric lamp by Edison, who, in 1879 — despite the fact that he had capabilities to go with a 40 watt bulb — decided to go with a 13 watt bulb because he wanted the exact look and feel of the light to mirror that of the gas light. And last but not the least, as far as inventors are concerned, I always tell people, develop complementary skills.

Usually inventors are technologically superb in their field, in their domain. But technological capabilities in the absence of market commercialization capabilities is usually a disaster and these products never cross the chasm. More importantly, technological capabilities alone can plague you with what we call as the developer's curse.

Timeline between Invention and Commercialization - Slide 41



Timeline between Invention and Commercialization

Innovation	First patent	First major commercialization
Manual Typewriter	1714 (Henry Mill)	1878 (Remington-Schoen)
Refrigerator	1834 (Francis Perkins)	1914 (GM / Kelvinator)
Automobile	1860 (Etienne Lenoir)	1902 (Randolph Chris)
Radio	1896 (Marconi)	1921 (RCA / Westinghouse)
Washing Machine	1906 (Woondrow)	1908 Hurley Machine Company (Alva Fisher)
Microwave Oven	1946 (Raytheon)	1967 (Raytheon)*
VCR	1950 (Ampex)	1967 (Cartivision)*
PC	1971 (Intel)	1974 (Scelbi)
PDA	1975 (Sam Pitroda)	1980 (Toshiba)

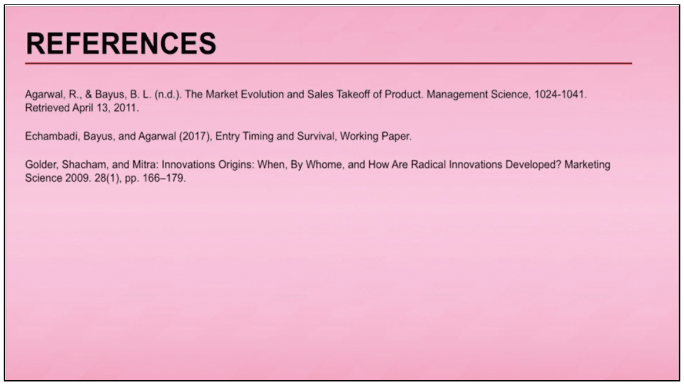
Transcript

You are too focused on your development and in your product and being product focused that you forget the consumer focus aspect of the invention. Given the huge time lag between invention and commercialization, I thought it would be interesting for you to see what happens between the first patent and the first major commercialization.

Let's look at the manual typewriter. The first patent was actually in 1714. And the first major commercialization was in 1878. So there is life in an industry even before the first major commercialization. And a lot of times we only focus on the time after commercialization. Look at the automobile. The first patent was in 1860. But the first major commercialization was in 1902. Look at VCRs. The first patent was in 1950, and the first major commercialization was in 1972.

So as you can see, the time lag between the first patent and the first commercialization is usually long and there is a lot of patience involved in terms of the commercialization. But more importantly, commercialization is not only the major outcome for startups. You could think about licensing. You could think about acquisition as potential strategies as well.

References - Slide 42



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Transcript

No instruction provided during this slide.

Lesson 2-3 Mapping Performance and Expectations in an Innovation Context

Lesson 2-3.1 Mapping Performance and Expectations in an Innovation Context - Part 1

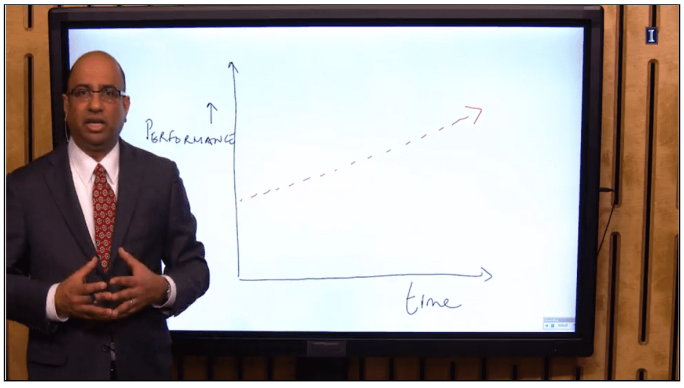
Media Player for Video

Professor Raj Echambadi - Slide 43

Transcript

In this lesson, we are going to learn about the issues, challenges, and opportunities of managing in a mature phase. Because when you think about the mature phase of an industry, while companies know what consumers expect, sometimes they can go overboard and start shooting consumer needs. And we are going to learn how to figure these out and how to create an appropriate product so that the consumer needs are optimally satisfied.

Mapping Performance and Expectations in an Innovation Context (1 of 4) - Slide 44



The slide contains a graph representing a dotted line starting from a point below the middle of the Y-axis and increases linearly. Here Time is on the X-axis and Performance is on the Y-axis.

Transcript

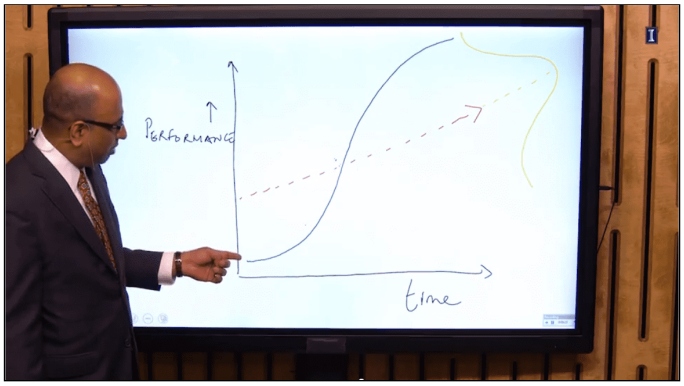
We know products evolve and industries evolve, so it makes eminent sense for us to develop appropriate strategies for innovations that are in the nascent stage vis-à-vis innovations in the mature stage. So how do we figure out what is appropriate and what should managers do? Failure framework actually gives the answer. It was developed by Professor Clayton Christensen, and I've adapted it from "The Innovator's Dilemma" book.

And the two axes for this failure framework are the X-axis happens to be time, and the y-axis happens to be the performance on what we call as the dominant industry attribute. Some people might call it primary attribute. Some people will call it basis of competition, but the logic is fairly straightforward. Whenever consumers look at a product or a category, they zone in on an important criterion or a rank-ordered set of criteria. Think about a microprocessor. You look at the speed of the chip. Think about a hard disk drive. You think about the storage capacity. That is what we call as the performance on the primary or the dominant attribute. Once we have done that, what is important for us is to plot the customer expectation trajectory, and I'm going to plot the customer expectation trajectory, or the market needs trajectory, in a dotted line.

As far as the customer expectation trajectory is concerned, it's very akin to the customer expectation we have. Think of going to a restaurant. You have a certain expectation in your head about how the restaurant is going to perform, what the food is going to be, how the service needs to be. And then you compare the actual performance of the restaurant against these expectations. And when you aggregate everybody in the segment and create a particular trajectory, that is what we call as the market need trajectory or the customer expectation trajectory.

An associated concept as far as the customer expectation trajectory is concerned is it makes sense to have the segment at this point in time drawn as well. And you will see here the customer expectation trajectory actually maps onto the center of the bell curve, which basically means that the center of the market is the most lucrative market if you are focused on the mass market. But there are extremes on the high performance side and the low performance side as well, which creates opportunities for innovation.

Mapping Performance and Expectations in an Innovation Context (2 of 4) - Slide 45



The slide contains a graph with Sinusoidal S curve intersected by the dotted line which starts from a point below the center of the Y-axis where time is on the X-axis and Performance is on the Y-axis.

Transcript

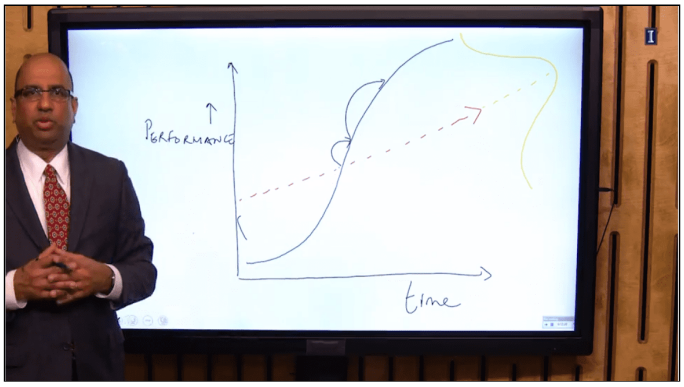
Now that we have done the customer expectation trajectory and the associated bell curve of the segment preferences, now it is time for us to introduce a concept called technology trajectory. And when you map the technology trajectory — Professor Christensen drew it as a linear curve. I'm going to draw it as an S curve to make it consistent with what we have done so far. And the technology trajectory curve follows this S curve pattern.

In the beginning, in the nascent stages of the industry, the technology is much, much, much lower than what the customer expectations are. Over time, it gets better and better and better. It meets the needs of the customers at some point in time. And be — beware when you focus here, that means you're also focused in the center of the market. You have attacked the center of the market, or the mass market, appropriately with your strategy. That's what this means. And then it gets better and better and better as far as technology is concerned because of learning, and at some point in time, diminishing sensitivity sets in.

Now, you may say, "Wait a minute. What does this really, really mean?" Well, if you think about this, you know, what does technology trajectory being much lower than the customer expectation mean? What that means is that — let's go back to 120 years, and let's look at the late 1880s when you had the dominant transportation option in the United States being the horse and buggy. And at that point in time, we had the first cars that came in. And the first cars that came in in the late 1800s were not as

reliable as the horse and buggy transportation. But cars got better and better and better. They overcame their technical constraints, and then they got — because of learning, they got better. And at some point in time, they cater to the entire segment.

Mapping Performance and Expectations in an Innovation Context (3 of 4) - Slide 46



The slide contains the same information as Slide 45 Mapping Performance and Expectations in an Innovation Context (2 of 4). Two small loops are drawn above the point on the S curve where the dotted line cuts the S curve. These loops represent innovation.

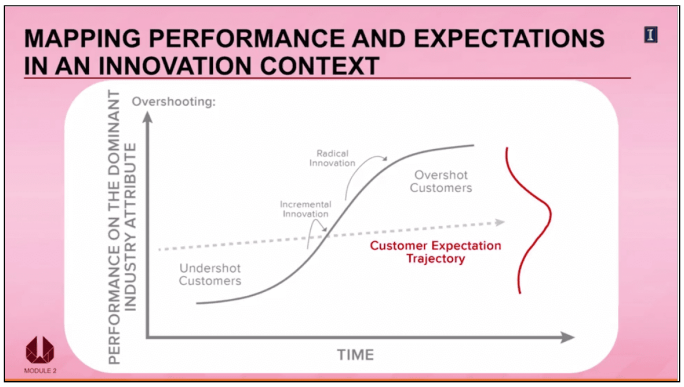
Transcript

So now that we have done the customer expectation trajectory and the technology trajectory, there are two important aspects that you need to understand. One, the notion of incremental and radical innovation. So any time you have a jump on the dimension that the customers value, that is an innovation, and a small jump is what we call as incremental innovation. A large jump is what we call as a radical innovation. But these are sustaining innovation because these are happening on the dimensions that consumers already know about. And the second and more important aspect here is that in the nascent phases of the industry, the technology trajectory is much lower than the customer expectation, and this is what we call as undershooting. On the other hand, once it intersects the customer expectation trajectory, and it gets better and better and better, at some point in time it is much, much higher than what the customers expect. And this is what we call as overshooting.

Now, what are the problems with overshooting? Overshooting can create feature creep, can create feature bloat, which effectively means if you're here, you will create a product that is costly, and you will pass on those costs to the consumers. And consumers then might look at cheaper options, if you will, so that is one problem. But an interesting aspect is if you are the only firm that has overshot, you have no problems. You can keep overshooting, and consumers will be willing to pay for you because you are the only player in the competitive market. But a lot of times what happens is multiple players are actually in the same space as you are. And if that is the case, if multiple firms have parity in this dominant performance attribute, then there is potential for commoditization if somebody else decides to compete on price.

So how do you avoid commoditization? You avoid commoditization by changing the basis of competition from this primary attribute to something else. Think about Apple. With the iPhone in 2007, what Apple did was change the basis of competition. BlackBerry and Nokia were competing on functionality, and iPhone competed on simplicity. What they did essentially was change the basis of competition to people who are focused on functionality and evolved and moved over to simplicity. And this is what you need to do, and this is what we call as sequential evolution in the product life cycle.

Mapping Performance and Expectations in an Innovation Context (4 of 4) - Slide 47



The slide contains a graph representing the Failure Framework with an s-curve of the failure scale is intersected by sloped straight line depicting customer expectation trajectory. The performance of a dominant industry's attribute is located on the y-axis (undershooting to overshooting moving vertically), while time is located on the X-axis. The framework represents the relative slopes of the customer expectation trajectory versus the technology trajectory. The left hand side of the s-curve represents undershooting, the middle represents it is in-line, and the right hand side represents overshooting customer expectation. Small leaps on the s-curve represent incremental innovations, while longer leaps signify radical innovations introduced by the firm.

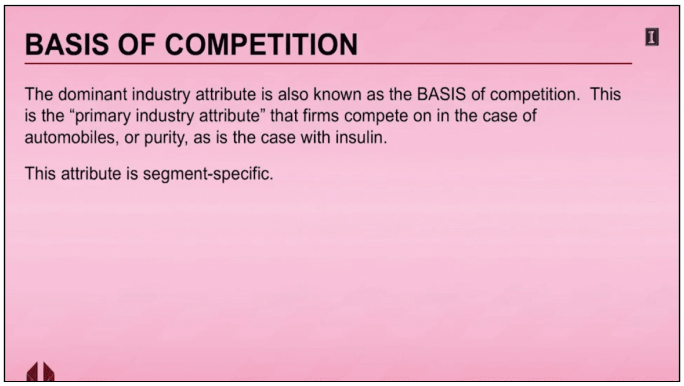
Transcript

As you're looking at the failure framework, what is very important are the relative slopes of the customer expectation trajectory and the technology trajectory. The actual slopes don't matter. If the slopes are relatively different, then you are likely to have overshooting problems.

Lesson 2-3.2 Mapping Performance and Expectations in an Innovation Context - Part 2

Media Player for Video

Basis of Competition - Slide 48



The dominant industry attribute is also known as the **basis** of competition. This is the "primary industry attribute" that firms compete on in the case of automobiles, or purity, as is the case with insulin.

This attribute is segment-specific

Transcript

The dominant industry attribute is known as basis of competition. Let's assume that I am in the market for a small sedan, and I'm interested in the functioning of the car.

Professor Raj Echambadi - Slide 49

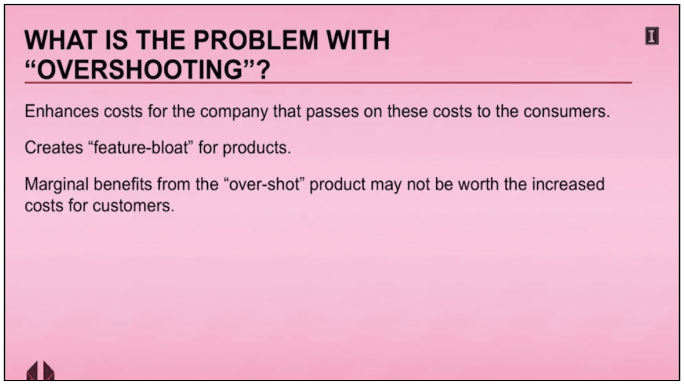
Transcript

Then, for my segment, functionality of the car is what we call as the basis of competition. In a higher-end luxury car, where almost all the cars have parity products in terms of functionality, i.e, all products perform very similarly, some car might come up with a beautiful styling on their car, which effectively means the basis of competition now moves from functionality to one of form. Let me give you a simple example of insulin.

When you think about insulin, which is what diabetic patients use, insulin, the purity of insulin is very critical. And, therefore, companies compete on the purity of the product. In that case, purity is actually the basis of competition. So any time you look at the primary attribute that the segment values, that's what we call as basis of competition.

Overshooting means that the company is actually offering more on the attribute than what the consumer expects or desires. And usually, what happens with overshooting is, the costs of the product actually go up.

What is the problem with "Overshooting"? - Slide 50



Enhances costs for the company that passes on these costs to the consumers.

Creates "feature-bloat" for products.

Marginal benefits from the "over-shot" product may not be worth the increased costs for customers.

Transcript

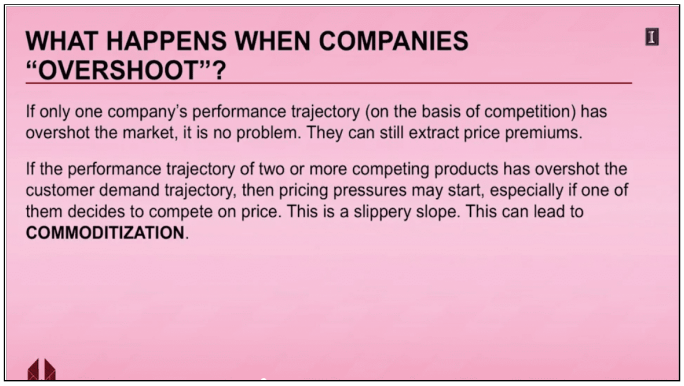
And when the costs go up, usually, the companies either try to pass on the costs, if they can, or they try to hold onto the costs, if you will, which effectively means that their margin goes down. But the second thing with overshooting is, you get into what we call as feature-bloat or feature creep. You add so many features on your product, and the consumers may not sometimes notice it.

Professor Raj Echambadi - Slide 51

Transcript

And one thing that I want to caution people is, when you offer a complex product, it may not necessarily all the time be value. Complexity can actually create feature fatigue. And last but not the least, consumers may not find the marginal benefits of your overshooting attribute to be worth the costs that they have to pay, which effectively means they may start looking for cheaper alternatives and move out of your sale entirely.

What happens when companies "Overshoot?" - Slide 52



If only one company's performance trajectory (on the basis of competition) has overshot the market, it is no problem. They can still extract price premiums.

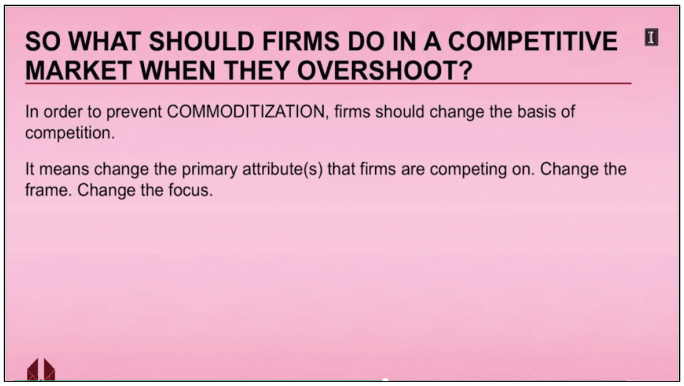
If the performance trajectory of two or more competing products has overshot the customer demand trajectory, then pricing pressures may start, especially if one of them decides to compete on price. This is a slippery slope. This can lead to **Commoditization.**

Transcript

When a company overshoots on an attribute, the marginal benefits of that overshot attribute may not be worth the costs to the consumer. And sometimes if the costs are passed along to the consumers, they may start looking for cheaper alternatives, which leads me to a larger point. If you are the only company that has overshot, then there is usually no problem. You can continue to have the price premiums because the competitive situation is such that you can always charge for your value.

But at a broader level, if there are two or more players who are very similar in terms of the basis of competition, then we have parity products. If all three players continue to provide the overshot products at the same prices, you have no problem. But on the other hand, if one of them decides to compete on price, then it's a slippery slope. And this is what we call as commoditization. The product actually becomes a commodity because consumers think all the products are the same; therefore, they start choosing on a concrete attribute of price. Be very careful. Once you compete on price, unless otherwise you have long-term, sustainable advantages like Walmart or Southwest Airlines or Ryanair in Europe, competing on price is usually a dicey proposition. So what should firms do when there are multiple parity players on a particular basis of competition? My advice is, don't go down the price path because all you will do is hasten the commoditizing journey for all the products in your particular industry.

So what should firms do in a competitive market when they overshoot? - Slide 53



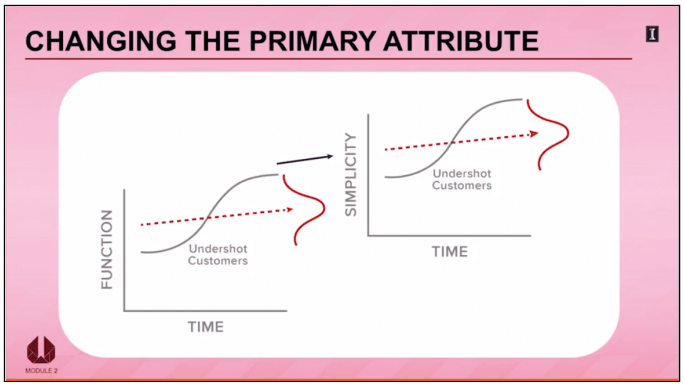
In order to prevent **Commoditization,** firms should change the basis of competition.

It means change the primary attribute(s) that firms are competing on. Change the frame. Change the focus.

Transcript

So what should you do? Change the basis of competition. Think about the car industry in the '70s. All cars were big. They were competing on the functionality of the product until the small cars from Japan came in, and they started competing on reliability. And then you had Saturn in the 1990s, in the US that competed on the convenience of selling. What they all did was for their innovative products, they actually changed the basis of competition. When you think of computers, in the '60s, they competed on capacity. And then when you talked about laptops, they competed on convenience. And then when you are talking about tablets, they are all competing on simplicity. So this is what you need to do in terms of changing the basis of competition, and you can also extract price premiums. Change the basis of competition by changing the frame and changing the focus.

Changing the Primary Attribute - Slide 54



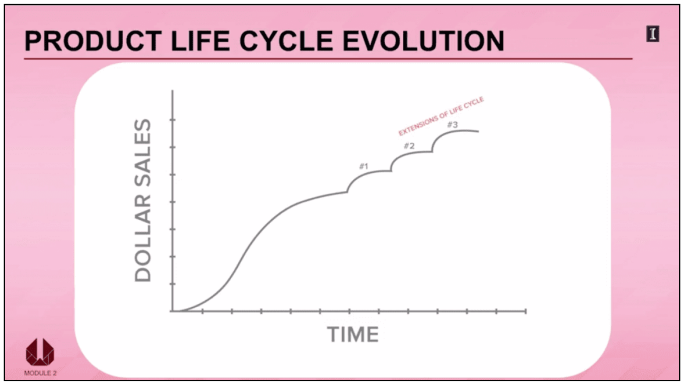
The slide contains two graphs representing overshooting customers where one graph has Time on X-axis and function on Y-axis whereas the other graph has Time on X-axis and Simplicity on Y-axis.

Transcript

So what does this mean, changing the primary attribute? Let's take the case of the iPhone. When they launched in 2007, you had Blackberry and Nokia that was focused on functionality. Borrowing from the functionality of Nokia and Blackberry, Apple added the simplicity option. In a similar vein, if you look at the personal computer industry over the last 40 years, initially, computer manufacturers focused on functionality. And later on, they focused on the convenience for the customers and created laptops. And later on, they focused on simplicity and focused on tablets.

So as you see, over and over and over, it becomes like Lego blocks. Once one primary attribute is satisfied, companies add another attribute that becomes important to the consumers and keep on building sequential products. Let's take an example closer from home. We launched the online MBA program last year. We call it the iMBA. It was targeted to working professionals around the world. While working professionals were interested in the functionality of iMBA program or the content provided from an elite university, such as the University of Illinois, they were actually constrained because they were not very mobile. They could not come to the University of Illinois at Urbana-Champaign at a fixed time. And therefore, they were looking for a convenient option. So we took our world-class curriculum that we offer in our face-to-face programs and added a flexible, stackable MBA program that they could do on their own time. In other words, what we did was we changed the basis of competition from one of functionality to one of convenience.

Product Life Cycle Evolution - Slide 55



The slide contains Product Life Cycle Evolution as a line graph with Time on X-axis and Dollar Sales on Y-axis. The line graph follows a slight S curve trend till the middle of the graph followed by 3 bumps labeled as Extensions of Life Cycle.

Transcript

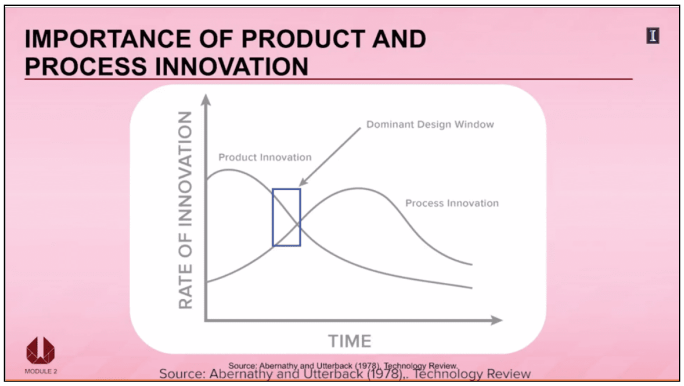
In the mature stage of the industry when there are many parity products on the primary attributes, commoditization sometimes is inevitable. In order to avoid commoditization, what firms must do is to change the basis of competition to something else and strategically renew themselves, so that they can continue to extend the lifecycle and thrive in the long run.

Lesson 2-4 Types of Innovation

Lesson 2-4.1 Types of Innovation

Media Player for Video

Importance of Product and Process Innovation - Slide 56



The slide contains the Importance of Product and Process Innovation as a line A line graph with Time on the X-axis and Rate of Innovation on the Y-axis. On the graph, a line labeled Product Innovation starts high on the Y-axis and dips over time. A line labeled Process Innovation starts low on the Y-axis and curves up, then back down over time. A blue box marks an area just before and including where the two lines intersect. This box is labeled Dominant Design Window.

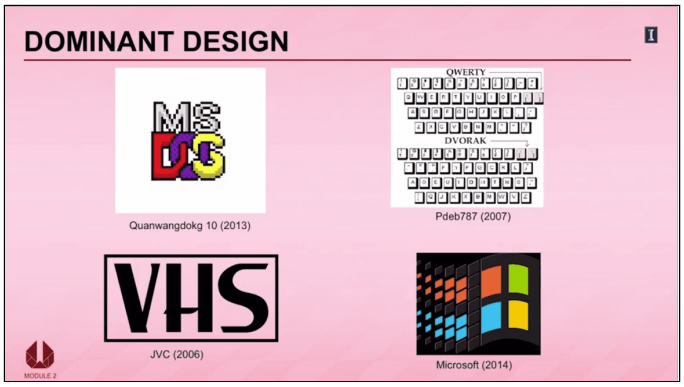
Source: Abernathy and Utterback (1978), Technology Review.

Transcript

Innovation is typically used as a general catch all, one size fits all term. In reality, there are many characteristics of innovations. In the nascent stage of the industry, product innovation dominates. And over time, the rates of product innovation actually decline. On the other hand, process innovation starts off at lower rates in the beginning of the industry. And then, subsequently takes off. When more and more and more consumers come into the system, when scale is built into the industry, companies can actually amortize the costs over a larger base. Therefore, providing cost-based advantages. More importantly, at some point in time, the industry gravitates to a single design called the dominant design, which helps in standardization. And therefore, efficiency as far as the industry is concerned. Let's take the example of the auto industry in the early 1900's. From its bicycle and carriage origins, there was significant product innovations in the auto industry in the early 1900's. You had front mounted four cylinder engines. You had shaft driven transmissions. You had pressed steel frame. All of it helped move towards the luxury cars that actually culminated in the first Ford's model T. Which was the culmination of a lot of product development at first. That developed the first car for the mass market.

In 1909 the sales takeoff happened in the automobile industry. The assembly line was introduced by Henry Ford in 1913. And what we saw after that was that the rate of product improvements were much, much, much lower than the process improvements. And this trend of declining product innovation in the mature phase with accompanying increase in process innovation is a trend that replicates itself in all industries.

DOMINANT DESIGN - Slide 57



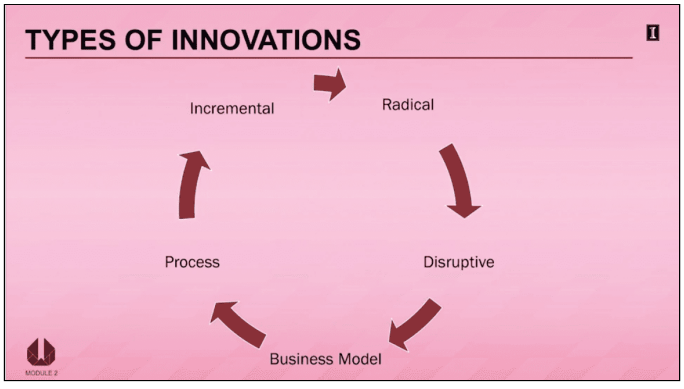
The slide contains four logos: MSDOS Source: Quanwangdokg 10 (2013). VHS logo. Source: JVC (2006). Illustration of the QWERTY keyboard next to the DVORAK keyboard. Source: Pdeb787 (2007). Microsoft logo. Source: Microsoft (2014).

Transcript

So, what is a dominant design? When you have a new to the world innovation, alternative designs compete. For example, think of the video tape industry. You hired two competing standards. VHS and Betamax. And, of course, VHS prevailed. Think about the typewriter industry. You had the QWERTY keyboard versus the Dvorak keyboard. And, of course, the QWERTY keyboard won out. Think about the war of the currents in the late 1800's. You had the alternating currents versus the direct currents. The bottom line is when you have multiple designs that compete, only one architecture becomes the standard in the long run. That architecture is what we call as the dominant design.

Dominant design is the design that is preferred by the mainstream consumers. For example, MS DOS or Windows. These all became dominant design. And because of the evolution of the dominant design, you have standardization in the industry and subsequent development of complimentary products. One point to emphasize is that dominant designs are usually not always better. But they do capture the loyalty of the market. And they capture the loyalty of the market either because of network effects or because of their technological superiority or sometimes both. But the critical point is that they enforce the standardization in the industry, so that complimentary economies can actually be sought.

Types of Innovations - Slide 58



The slide contains five arrows that forms a circle. These 5 arrows represents 5 types of innovation and their order is as follows in clockwise direction: Process leads to Incremental leads to Radical leads to Disruptive leads to Business Model.

Transcript

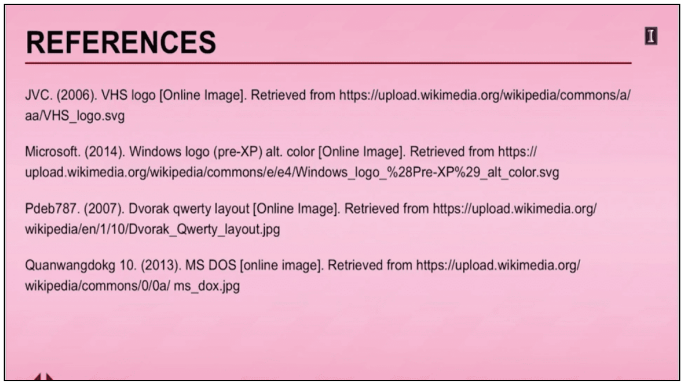
When we think of the various types of innovations. There are usually five types of innovations that standout. First is process innovation, which ensures that companies become more efficient. Usually happens after the standardization. And thereby, enables companies to wring cost out of the system. And serve consumers in a cost-effective way.

The second type of innovation is what we call as incremental innovation. When consumers buy a product, they usually zero in on one attribute or a preordered set of attributes. And incremental innovation is usually a gentle jump on the dimension that matter most to consumers. Radical is very similar to incremental, in the sense that it is a jump on the dimension that matters to the consumers. But it is usually a drastic jump or a discontinuous jump.

The fourth type of innovation is what we call as a disruptive innovation. Disruptive innovation can be exemplified with the following example. Think of Borders in the early 1990's. Borders was a very successful brick and mortar retailer that sold book. And Amazon.com was launched as an online retailer. While you could go to Borders and buy a book and come back home immediately, you had to order a book on Amazon.com and wait for a few days. And on the primary basis of competition, which happens to be the time it takes for you to take over, to bring home a book. Amazon.com actually performed poorly compared to Borders. But over time, they got better and better and better. They added more products. And they became a better company, if you will. So, disruption is fundamentally a type of innovation where the initial quality is much, much lower than what the mainstream wants. And thereby, caters to a niche market. But over time, the niche market grows into a mass market.

The last type of innovation is a business model innovation, which I will illustrate with an example. Let's take the case of a company that sells power tools to a business to business market. Wherein, the company sells power tools to its customers, who use it on their work sites. There are several pinpoints in this business model. The customers are responsible for the service. They have to maintain the spare parts and inventory. More importantly, they have to ensure that they have the right tools for the job site because absence of the right tool entails loss of revenues. So, if this company decides to alleviate the pinpoints and changes the business model from a product-oriented business model to a service-oriented business model, then we call it a business model innovation. So, what does it entail to becoming service oriented? The company now is responsible for periodic service of the tools. The company maintains the spare part for its customers. And absolutely ensures the right tools for the right job. More importantly, it gives loaner tool in case a tool breaks. And this is what we call as a business model change where the product centric focus has been changed to a holistic service centric focus.

References - Slide 59



JVC. (2006). VHS logo [Online Image]. Retrieved from https://upload.wikimedia.org/wikipedia/commons/a/aa/VHS_logo.svg

Microsoft. (2014). Windows logo (pre-XP alt. color [Online Image]. Retrieved from https://upload.wikimedia/commoms/e/e4/Windows_logo_%28Pre-XP%29_alt_color.svg

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Quanwangdokg 10. (2013). MS DOS [Online Image]. Retrieved from https://upload.wikimedia.org/wikipedia/commons/0/0a/ms_dox.jpg

Transcript

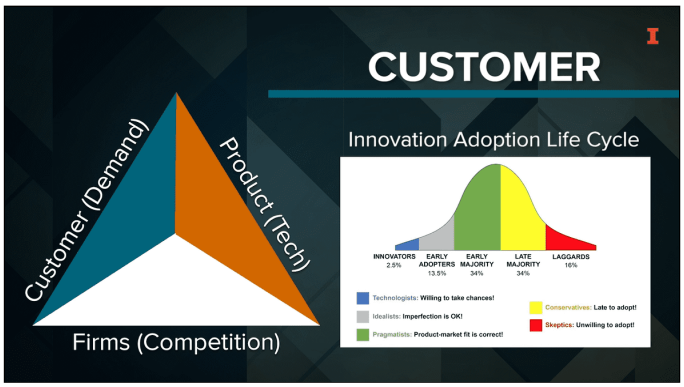
No instruction provided during this slide.

Module 2 Wrap Up

Module 2 Summary

Media Player for Video

Customer - Slide 60



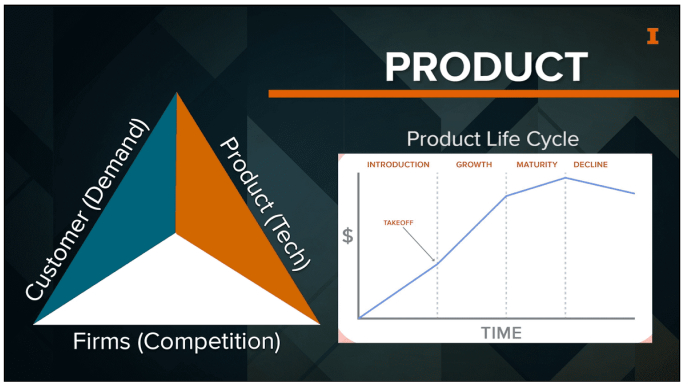
The slide contains the same information as Slide 2 Innovation Adoption Life Cycle and Slide 6 Customer, Products, and Firms Triangle

Transcript

First, the customer side, the innovation adoption life cycle. Remember that question I asked you at the start, how to think about customers over an innovation's life cycle. Well, this is the answer. It highlights five customer segments, each with different needs. For instance, the first two segments are drawn to the technology, and imperfect products are okay. But in the early mainstream, which is much larger, they're only interested in refined, perfected products.

So, the idea of segments with different customer needs should jump out at you. The first module really highlighted the need to match products with customer needs, but you can't freely choose your segment here. That's the insight because they adopt sequentially.

Product - Slide 61

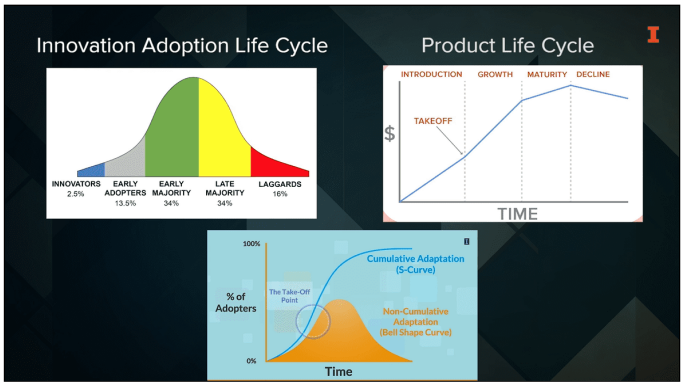


This slide contains the same information as Slide 6 Customer, Products, and Firms Triangle and Slide 3 Product Life Cycle

Transcript

So, you also have to consider the second piece. Second piece is the product side, the product life cycle. This is the S curve that goes through four stages of increasing performance. The technology starts relatively crude, buggy, so on, and you win here by focusing on that early adopter segment, where that's okay. The big implication is the clear need to develop the augmented product, not just advanced the technology, but also collaborate to develop infrastructure like complimentary products and establish a dominant design. This is how you cross that chasm between the tech-oriented early adopters and the larger group of mainstream adopters. Not recognizing this is a big part of why most products fall into that chasm and don't reach the payoff, the sales takeoff, that signals mainstream acceptance.

Innovation Adoption Life Cycle & Product Life Cycle - Slide 62



The slide contains the same information as Slide 2 Innovation Adoption Life Cycle, Slide 3 Product Life Cycle and Slide 15 Cumulative and Non-Cumulative Curves

Transcript

So, you see how the stages featured in the product cycle, the stages are critically intertwined with the customer segments featured in the innovation adoption life cycle. But there's still more to see here.

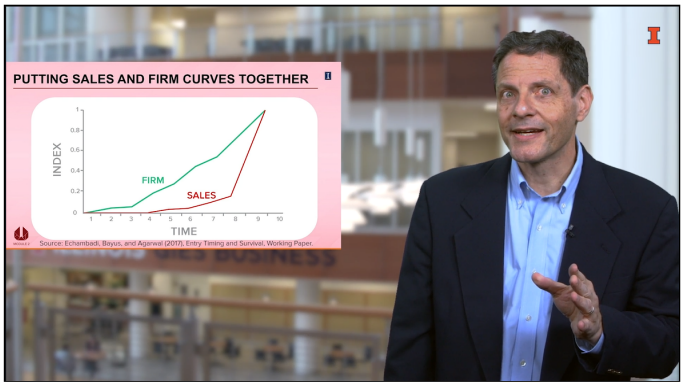
Professor Geoff Love - Slide 63

When is it best to enter new markets?

Transcript

One more thing is the answer to a critical strategic question. When is it best to enter new markets? The answer arises from the firm life cycle in the firm takeoff. The insight here is that firm takeoff happens early. Many firms enter as soon as the technology appears valuable, even while sales are very low. So, remember, I asked at the start, think about whether firm takeoff or sales takeoff happens first. Well, maybe surprisingly, it's firm takeoff often by several years. So, when do you enter? Well, Rogers' research indicated that getting into the fight before firm takeoff is best. Now, this isn't obvious, right? Some might say, "Wait for the market to prove itself." But the early firm takeoff tells you that if you wait, many others will be there waiting for you.

Putting Sales and Firm Curves Together - Slide 64



The slide contains the same information as Slide 37 What does the diffusion process mean?

Transcript

One more thing is the answer to a critical strategic question. When is it best to enter new markets? The answer arises from the firm life cycle in the firm takeoff. The insight here is that firm takeoff happens early. Many firms enter as soon as the technology appears valuable, even while sales are very low. So, remember, I asked at the start, think about whether firm takeoff or sales takeoff happens first. Well, maybe surprisingly, it's firm takeoff often by several years. So, when do you enter? Well, Rogers' research indicated that getting into the fight before firm takeoff is best. Now, this isn't obvious, right? Some might say, "Wait for the market to prove itself." But the early firm takeoff tells you that if you wait, many others will be there waiting for you.

Overshooting - Slide 65

The slide contains the same information as Slide 47 Mapping Performance and Expectations in an Innovation Context (4 of 4)

Transcript

The life cycle concept also doesn't just help in the early stages. Some of his best insights apply later on. We see this in that failure framework. That's the diagram showing the technology trajectory and the customer expectations trajectory. Early on, of course, we undershoot mainstream customer expectations, but the really cool insight for me arises as the market matures. That's when you often get overshoot. When the technology starts to offer more than the mainstream consumers need or are willing to pay for, an implication is that you have resist that strong temptation to just add more features. You'll fall prey to feature creep or the developer's curse. Instead, change the basis of competition. Avoid commoditization. You want to be like Apple, changing the basis of competition from functionality to simplicity with the iPhone. This is really big, and we hit it hard in the next module.

Now, this module closes with a couple of videos. One was about the types of innovation. The other showed how these concepts illuminate the evolution of a revolutionary innovation, the personal computer.

Professor Geoff Love - Slide 66

"What got you here won't get you there."

Transcript

So, there you go. So, to close, one catchphrase about life that I really like is, "What got you here won't get you there." We've used the idea of a life cycle to show how true that is in innovation. What got you here won't get you there. So, that's a wrap for this one. I'll see you next time.

Application Corner

GIES

The Evolution of the PC Industry

Media Player for Video

Professor Raj Echambadi - Slide 67

Transcript

In 1974, MITS Altair, ushered in the microcomputer revolution. Until then, mainframes and minicomputers dominated the space. MITS Altair was started in 1974, by Ed Roberts. Who targeted this computer for hobbyists. He used Microsoft BASIC. He brought in Intel 8080 as the microprocessor. And the result was a functional product, which was only available for the technologically advanced. Because programming was tedious. The product was actually featured in Popular Electronics. At that point in time, the product was called PEC. And some editor at Popular Electronics, decided that the name was too technical. And given that this was a stellar event, decided to call the computer based on a star. And hence, MITS Altair was born. And the interesting thing is, this feature in Popular Electronics, gave birth to the home brew computer club. From which 23 computer companies actually evolved, including Apple. The interesting story is, four years after the launch, Ed Roberts decided to get out of the microcomputer industry. Sold his company to Pertec Computers for six million dollars. And actually, became a doctor in Georgia.

Firm Takeoff happened in 1977 - Slide 68

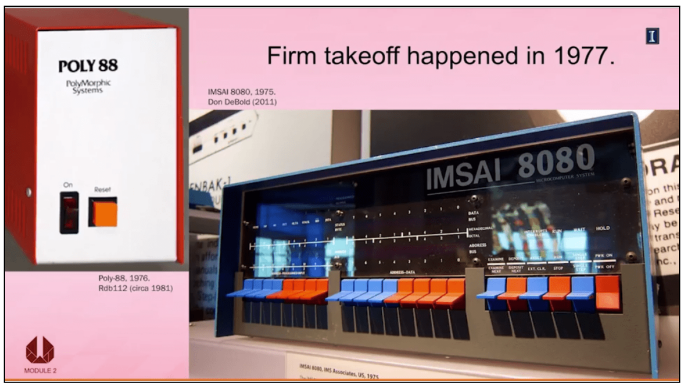


Image of IMSAI 8080, 1975

POLY 88 Polymorphic Systems

Poly-88, 1976.

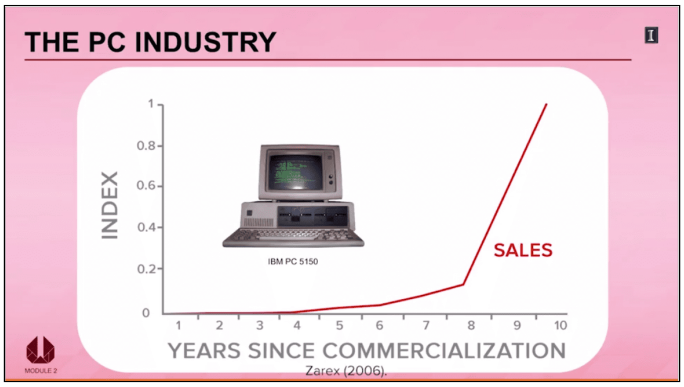
Rdb112 (circa 1981)

Transcript

Along the same time in about 1975, IMS Associates, which was a computer consulting company, also came up with their own computer called IMSAI 8080. Functionally based on the MITS Altair, IMSAI 8080 was a functionally better product. Because of certain functional features. Again, targeting the hobbyists. They were a superior product. But again, technologically tedious for the mainstream market. But the interesting thing about IMS Associates, was they were not only in the computer assembly and manufacturing. They also tried to go into the retailing. Subsequently, they got into computer retailing space through their ComputerLand stores.

Around the same time in 1975, you had Poly-88, which was known as the orange toaster because of its color. And because it generated a lot of heat. All these products were actually sold through classified ads in Popular Electronic Magazines. And they were actually sold by direct mail. In 1977, the firm takeoff happened. Which fundamentally meant that the technological uncertainty in the industry, had reasonably vanished. Which set the stage for infrastructure development. BYTE Magazine called the three computers that came after the firm takeoff, the PET 2001 by Commodore. The TRS 80 by Tandy Radio Shack and Apple, too, as the trinity of computing. Because all of them were sold through retailers. Tandy, through their Tandy Radio Shack. Through their Radio Shack stores. PET 2001, through a computer retailer. And of course, Apple through ComputerLand. And Apple was the first computer involving color graphics. And this was the first time the logo of Apple went from black and white to color, to reflect this particular change. And all these computers were in the $1,000 to $1,200 U.S. dollar range, at that point in time. And then, after the launch of these computers and after people started buying them through computer stores, we had IBM 511581.

The PC Industry - Slide 69

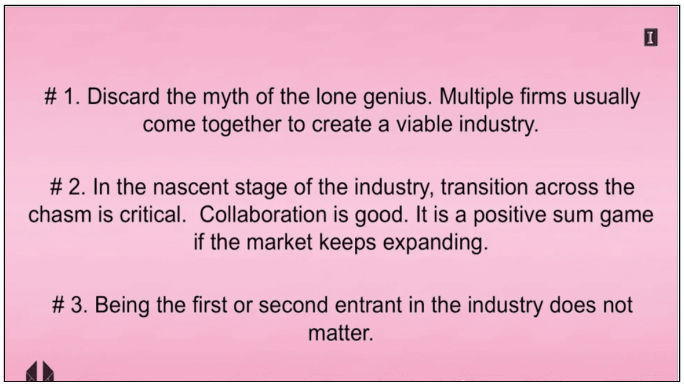


The slide contains a graph with Index on X-axis and years since commercialization on Y-axis. There is a sales line which reaches the highest point on maximum values of X-axis and y-axis. Image of an old computer: IBM PC5150

Transcript

The interesting story is, IBM was not in the personal computer space until 1979. There were a lot of companies like ATT, that were getting into the space. And IBM, at that point in time, was a dominant player in the mainstream - mainframe market, with a 60% share. But the interesting thing about IBM was they did everything. They sourced the materials themselves. They assembled and created the computers themselves. And they actually marketed the computers through their own internal salesforce. And serviced the computers through their own internal personnel. But this was a dynamically different model that they embarked on. What they basically did was they sourced their microprocess from Intel. They actually went ahead and sourced their operating system through Microsoft. And the result was history. Every computer that was made, had to be IBM PC compatible. And IBM became the dominant monolith is the first personal computer market for the next 20 years.

Myths - Slide 70



1. Discard the myth of the lone genius. Multiple firms usually come together to create a viable industry.

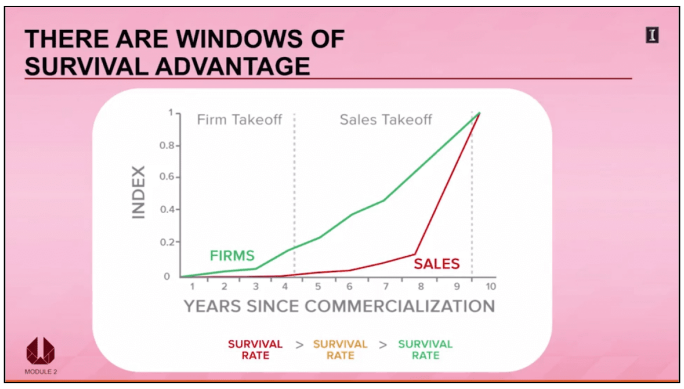
2. In the nascent stage of the industry, transition across the chasm is critical. Collaboration is good. It is a positive sum game if the market keeps expanding

3. Being the first or second entrant in the industry does not matter.

Transcript

So, what did we learn? First and foremost, discard the myth of the lone genius. Whenever I talk to people, people say to me, talk to me about Thomas Edison or Steve Jobs or Dr. Land from Polaroid. They're all visionary leaders. But please understand that it is great teams that come together to form a great product. So, it is never usually the lone genius that is capable of pushing a product to fruition. The second point I want to emphasize is that when you transition from being a niche product to a mass market product, collaboration is very critical. Transitioning the chasm to becoming a mass market product is priority. Which effectively means you need to collaborate with your suppliers, in order to create a winning product. In the nascent industry, transitioning across the chasm is a major strategic priority. Because if you don't transition the chasm, then there are huge problems. Which effectively means collaboration is a fairly critical trait. Collaboration with suppliers, collaboration with other players in the market, is actually critical. Because at the end of the day, expanding the category is actually far more important because it's a positive sum game. I always say to people, it is far better to have 20% of a watermelon, rather than 100% of a grape. That's exactly the philosophy.

There are Windows of Survival Advantage - Slide 71

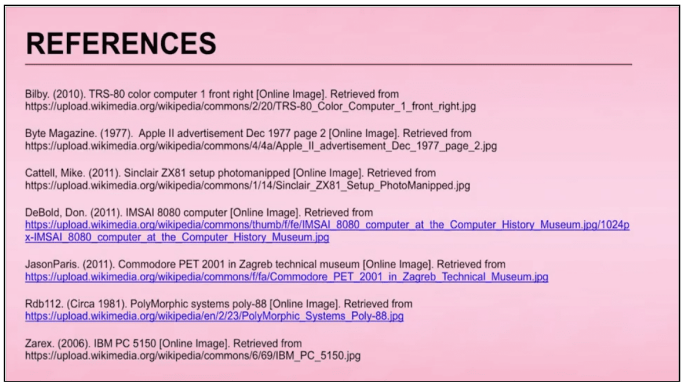


The slide contains the same information as Slide 37 What does the diffusion process mean?

Transcript

When you put this firm takeoff and the sales takeoff together, you realize one major lesson. Which is, being first or second in the industry or having first mover advantages, do not really matter. There seem to be windows of opportunities or windows of survival advantage. In our study of 22 innovations of all firms that entered these innovations over the last 100 years. We find that on average, firms that enter before firm takeoff, have higher survival rates than firms that enter between firm's takeoff and sales takeoff. Which indeed have higher survival rates than firms that entered after the sales takeoff. In other words, there are windows of opportunities and windows of survival advantage.

References - Slide 72



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Transcript

No instruction provided during this slide.